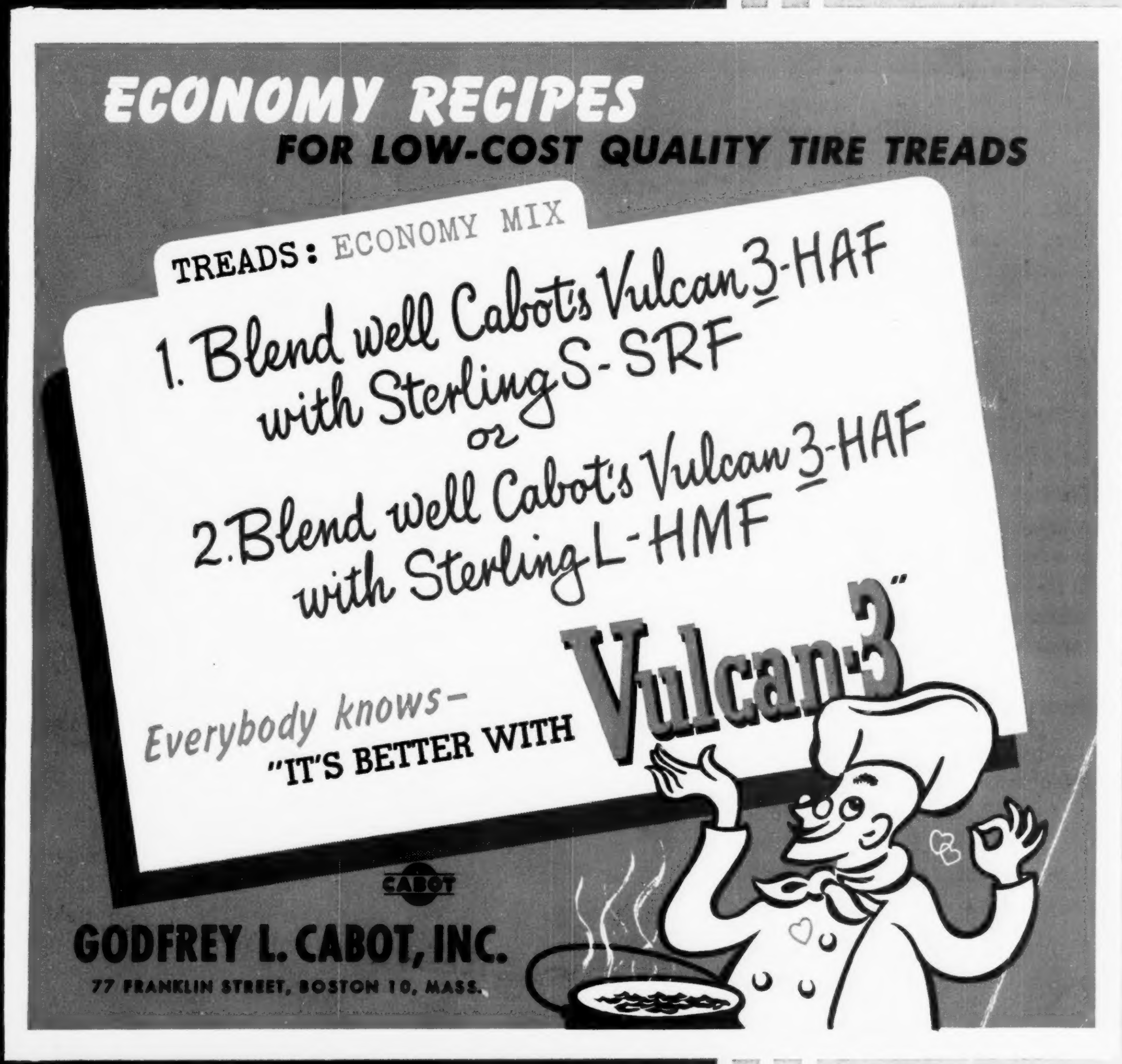
INDIA

RUBBER WORLD

OUR
60th YEAR

A BILL BROTHERS PUBLICATION

OCTOBER, 1949



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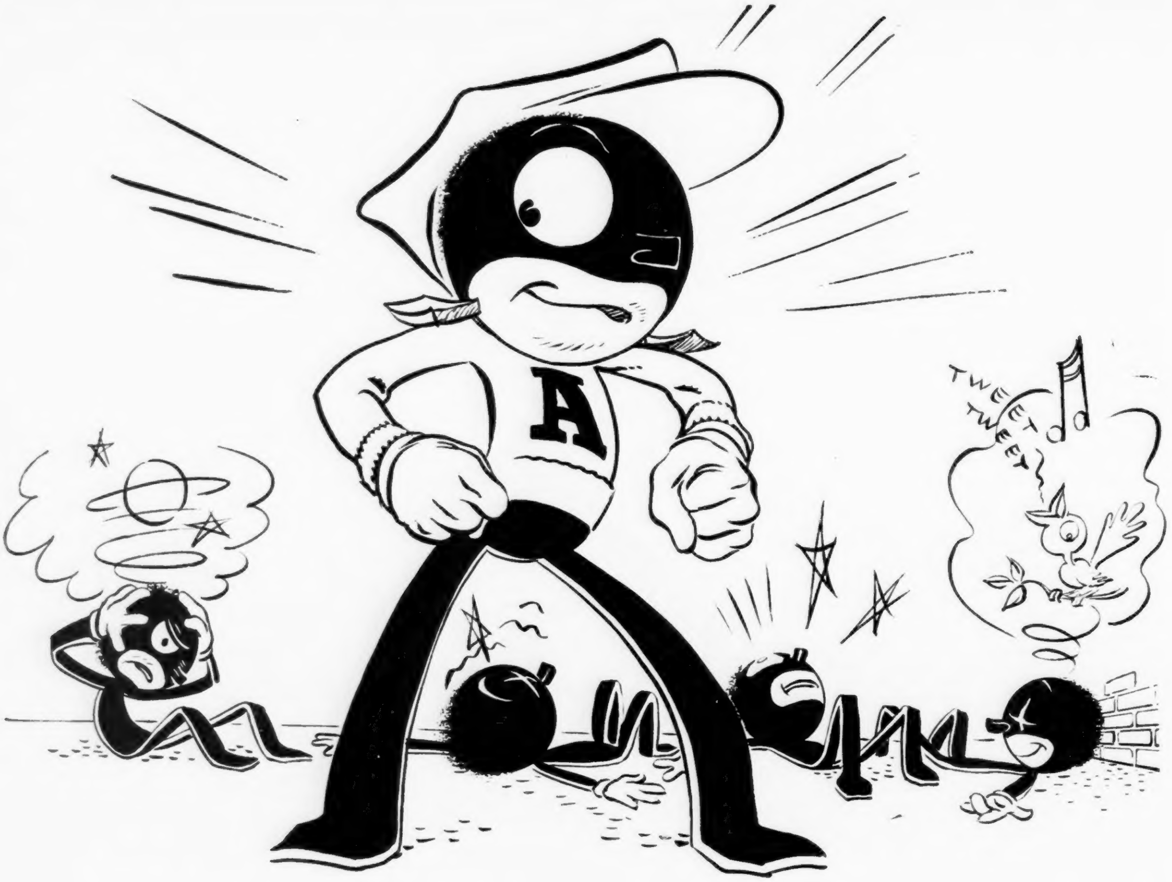


Philopolemic – *One addicted to strife*

Philblack* A – *The HMF black that can take a beating and come out on top!*

KNOCK out your processing problems with Philblack A! This fine, fast-curing HMF black incorporates rapidly. Extrudes and molds remarkably well, maintaining an exceptionally smooth surface. The suppleness and pliancy of uncured Philblack A stocks are retained after vulcanization, too.

In heavy-duty tire carcasses, Philblack A gives excellent heat dissipating properties. Result: cool-running, long-lasting tires.

Orders . . . *and larger re-orders* . . . for Philblack A confirm its championship caliber when used in the widest variety of rubber goods!

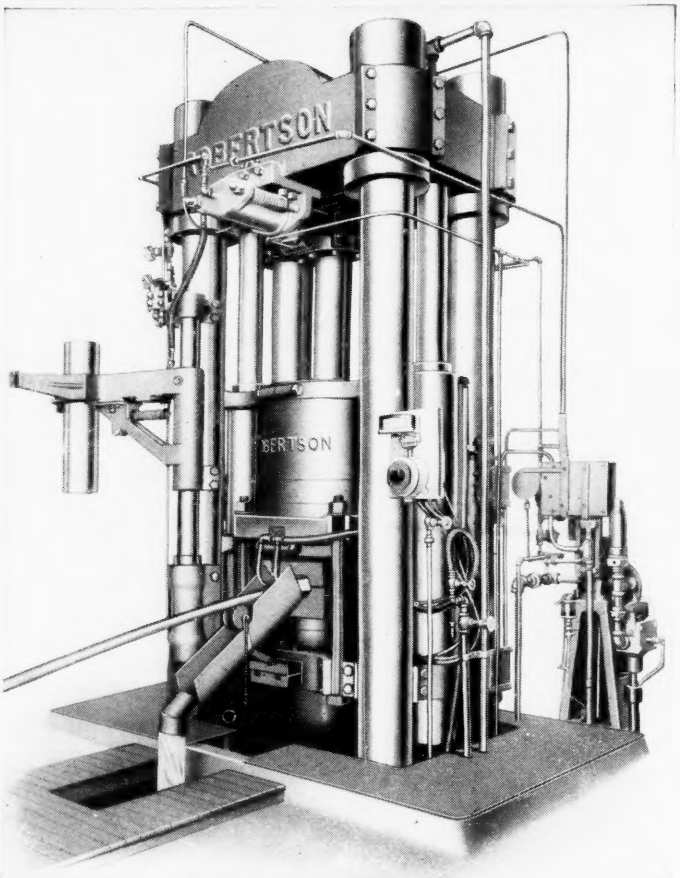
PHILLIPS CHEMICAL COMPANY

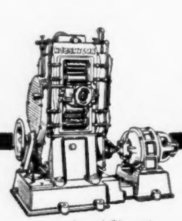
PHILBLACK SALES DIVISION

EVANS BUILDING · AKRON 8, OHIO

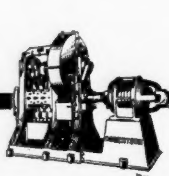
Warehouses in Akron, Boston, Chicago and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

*A Trade-mark

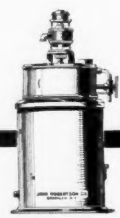




Lead Sheath Stripping Machine

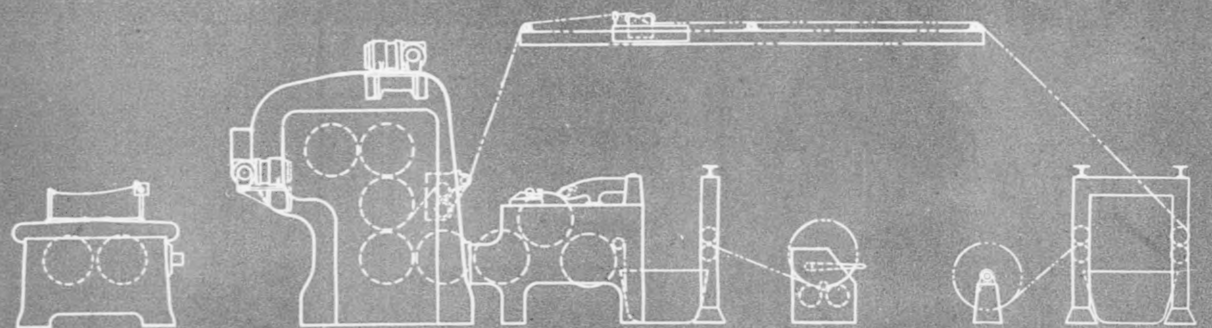


Hydraulic Pump

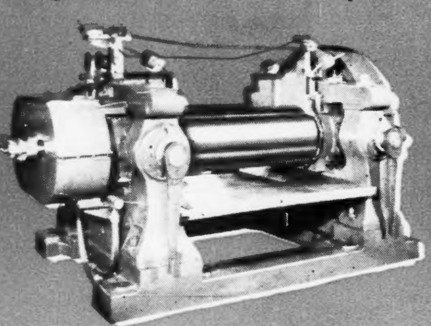


Open Lead Melting Pot

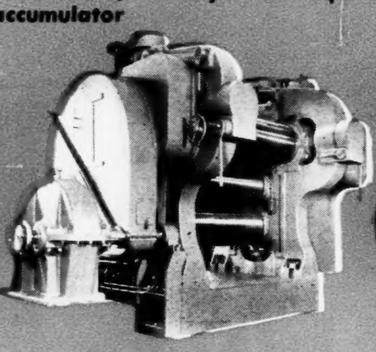
Engineered Equipment
for Continuous Processes



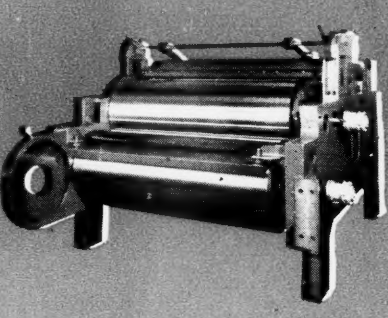
Continuous Calendering Process for supported or unsupported plastic sheet. Equipment includes fabric let-off stand with accumulator scray, fabric centering device, fabric pre-heating rolls, four-roll Calender, cooling rolls, and fabric wind-up with accumulator scray. Also included are facilities for trimming and winding up unsupported sheet. A stock warming up Mill is included, with stock transfer feeding conveyors as required.



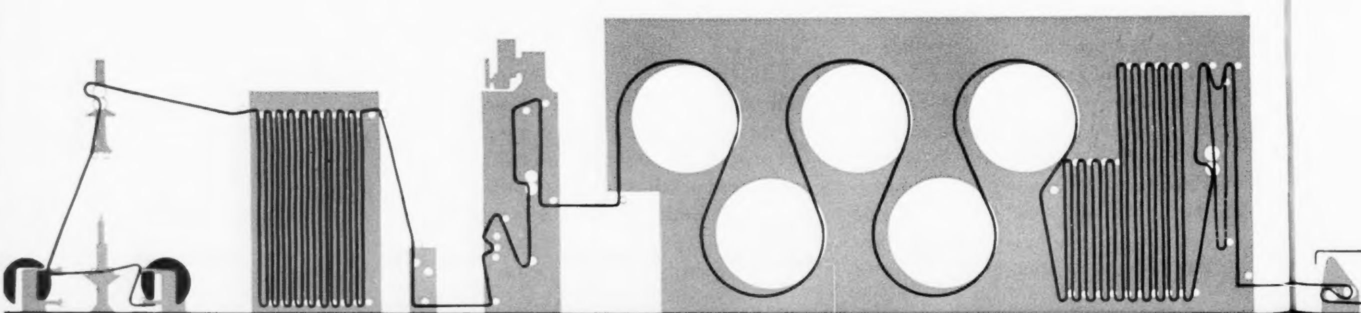
Warming and mixing Mill for plastics, 22" and 22" x 60", equipped with oil flood lubrication system, high pressure rotary joints, and tiltable stock guides.



Four-roll Calender for plastics, 24" x 68", including oil flood lubrication system, bored rolls, adjustable stock guides, high pressure rotary joints, motorized two-speed roll adjustment, and hydraulic roll stabilizing equipment.



Film and Fabric Cooling Roll Unit, with film trimming and wind-up device for mounting at the Calender.



Continuous tire fabric processing unit, including pre-dipping, drying, calendering, cooling, and wind-up equipment.

We engineer, build and install continuous processing equipment for the manufacturer of rubber or plastics products. Your inquiry concerning special or unusual requirements is invited. Our engineers are available for consultation.

Send for your FREE copy of this...

COMPLETE ENCYCLOPEDIA
OF RUBBER AND PLASTICS MILLS

Write today for Bulletin 173. No cost, no obligation.

W

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Please send me a copy of Bulletin 173.

Name ....

Company ....

Address ....

City .... State ....

This NEW, 40-page bulletin probably contains more information on "what is available" in mills and related equipment than has ever before been published in one manual.

Here you will find a table of sizes, capacities, power requirements, overall dimensions and other data on standard mills . . . general specifications, including details of a number of attachments . . . parts lists of single and twin mill units . . . and more than thirty illustrations of designed-for-the job mills (ranging from 6" to 28" in size), complete with descriptions of the special features of each. Also illustrated are refiners, washers and crackers, as well as other F-B processing units. The Farrel-Birmingham process-testing laboratory, where manufacturers are invited to explore the possibilities of new processing techniques, and the company's specialized engineering service are also described.

If you buy, specify or are in charge of the operation of this type of equipment, you should have a copy of this fact-filled bulletin.

FB-558

FARREL-BIRMINGHAM COMPANY, INC. • ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N.Y. *Sales Offices:* Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

Indispensable TO YOU IN THE RUBBER INDUSTRY—

Gives Your Products
PROTECTION and SALES APPEAL
at Little Cost!

BEACOFINISH—a unique family of coating materials conceived to give your products greater durability and eye appeal. These highly concentrated wax emulsions that can be diluted with up to four parts of water can be used with the utmost safety and economy.

BEACOFINISH is therefore of four-fold importance to you:—

1. ***It Protects*** your products against their natural enemies—air, sunlight, moisture and excessive handling.
2. ***It Improves*** the appearance of your product for its uniform coating stimulates greater consumer interest.
3. ***It's Economical*** because its high dilution potential (without losing efficiency) allows one gallon to cover 15,000 sq. ft.
4. ***It's Safe*** being a wax in water emulsion, it eliminates the fire and health hazards of volatile-solvent based finishes.

BEACOFINISH can be applied by dipping, sponging, spraying or brushing—dries in about 20 minutes—faster if force-dried—to give a hard protective coating of great elasticity.

BEACOFINISH may be ordered in Neutral or Black, in varying degrees of luster from brilliant to dull. It is so concentrated, from one drum you can obtain potentially up to five drums of superior coating for your products.

CONSULT US—WRITE US TODAY

Let us show you how BEACOFINISH can make your products more attractive and saleable—protect them from damage—you from loss—in production and transit!

THE
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PURITY·UNIFORMITY·DEPENDABILITY
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Chemical Manufacturers
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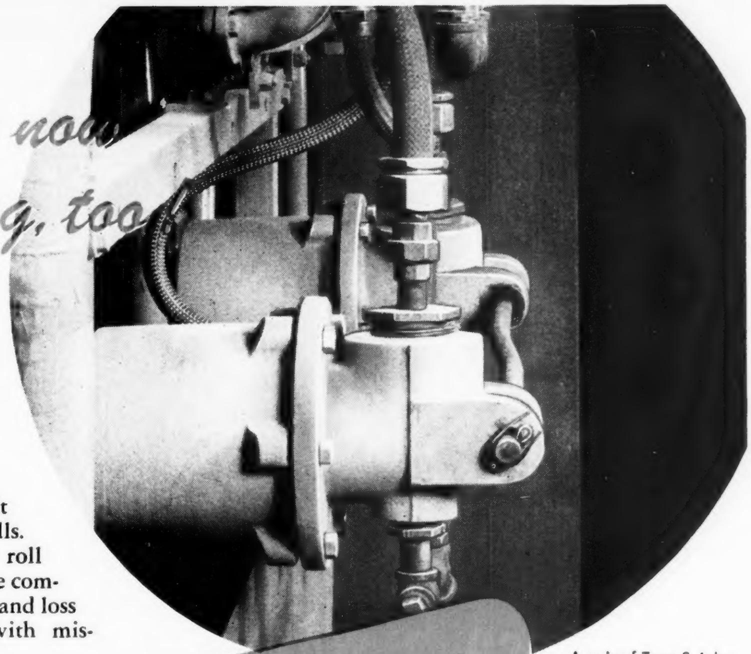
In Canada: PRESCOTT & CO., Reg'd.
774 St. PAUL ST. W., MONTREAL

his packless tuffing box is now elf-supporting, too



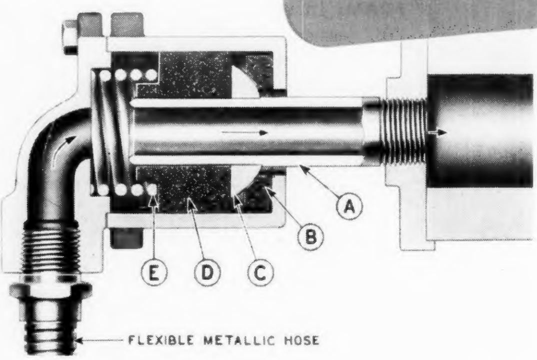
By eliminating all packing the Johnson Joint wiped away most of the troubles of old style stuffing boxes and steam fits. Now comes an advanced design, the new Type S, which ends the problem of misalignment, too—fits the Johnson Joint even more closely to the operating needs of the rubber industry.

There is no more efficient way to admit heating or cooling agents to rotating rolls. There is no better way to provide for roll drainage. And now there can be no more complete answer to the threat of rapid wear and loss of operating efficiency that comes with misalignment.

Get all the facts about the new Type S Johnson Joint for your mill. You'll find that the savings in maintenance alone will quickly pay the cost of switching over. Write for your copy of Bulletin JS.

A pair of Type S Johnson Joints installed on 26" x 84" rubber mill at Boston Woven Hose & Rubber Co., Cambridge, Mass. Note flexible connection permitting Joints to shift with rolls. Note, too, head lugs for stop rods to keep Joints from turning, as regularly furnished on larger joints.

TYPE S
Johnson
Rotary Pressure Joint



Nipple (A) is attached to roll or cylinder, has convex hemispherical collar (C) which rotates against machined surface of special carbon graphite seal ring (B). Guide (D) is also of long-lived, self-lubricating carbon graphite, is fitted carefully into the body. Spring (E) is for initial seating only; pressure within the Joint is the actual sealing force. Syphon roll drainage can also be provided through this same Joint; see installation view above.

- **Completely Packless** — It literally knocks the stuffing out of stuffing box troubles.
- **Self-Lubricating** — Needs no oiling of any kind.
- **Self-Adjusting**—Pressure sealed; the higher the pressure, the tighter the seal.
- **and now Self-Supporting**—Needs no external supports; shifts as the roll shifts; ends misalignment completely.

Product of The **Johnson Corporation**

869 Wood Street, Three Rivers, Michigan

Rotary Pressure Joints • Compressed Air Separators and Aftercoolers • Direct Operated Solenoid Valves • "Instant" Steam Water Heaters

NOW-

you can improve your latex products these 5 ways...

1. **Strengthen Adhesion**

2. **Increase Wear Resistance**

3. **Increase Modulus**

4. **Increase Tensile Strength in Saturated Paper**

5. **Decrease Water Sensitivity**

Read these facts about New Du Pont LUDOX®

COLLOIDAL SILICA

No matter what type of latex products you make, the chances are that "Ludox" can help you expand your markets with *new* or *better* products.

For broader use with maximum economy, "Ludox" comes to you as a 30% colloidal solution of almost pure silica particles, less than 1/1,000,000 inch in size. Here are a few examples of what it can do for you:

ADHESIVES: "Ludox" strengthens—up to *three* times—latex adhesion to a wide variety of surfaces, including fabric, leather and metal.

FILMS AND COATINGS: Greatly increased modulus, abrasion resistance and reduced water sensitivity can be obtained when "Ludox" is added to synthetic latex compositions.

THREAD: Relatively small amounts of "Ludox" nearly double the modulus of neoprene thread.

SATURANTS: In neoprene-saturated paper, "Ludox" increases tensile strength up to 51.5%, abrasion resistance up to 41%, and internal bond strength 49%.

FOAM: In neoprene foam approximately 20% less sponge solids are required to obtain a given modulus—with no adverse effect on flex life, bend flex and compression set.

IN ADDITION, other ways of applying "Ludox" profitably in the rubber field are being developed. *How can "Ludox" help you?* A Du Pont Technical Representative will be glad to visit your plant and study your problems.

Get These Helpful Facts. *Clip the coupon below for the latest Technical Bulletin on "Ludox" for latex products.*

DU PONT

REG. U. S. PAT. OFF.

LUDOX®

Colloidal Silica

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Wilmington 98, Del.

Please send me latest Technical Bulletin on "Ludox" for latex.

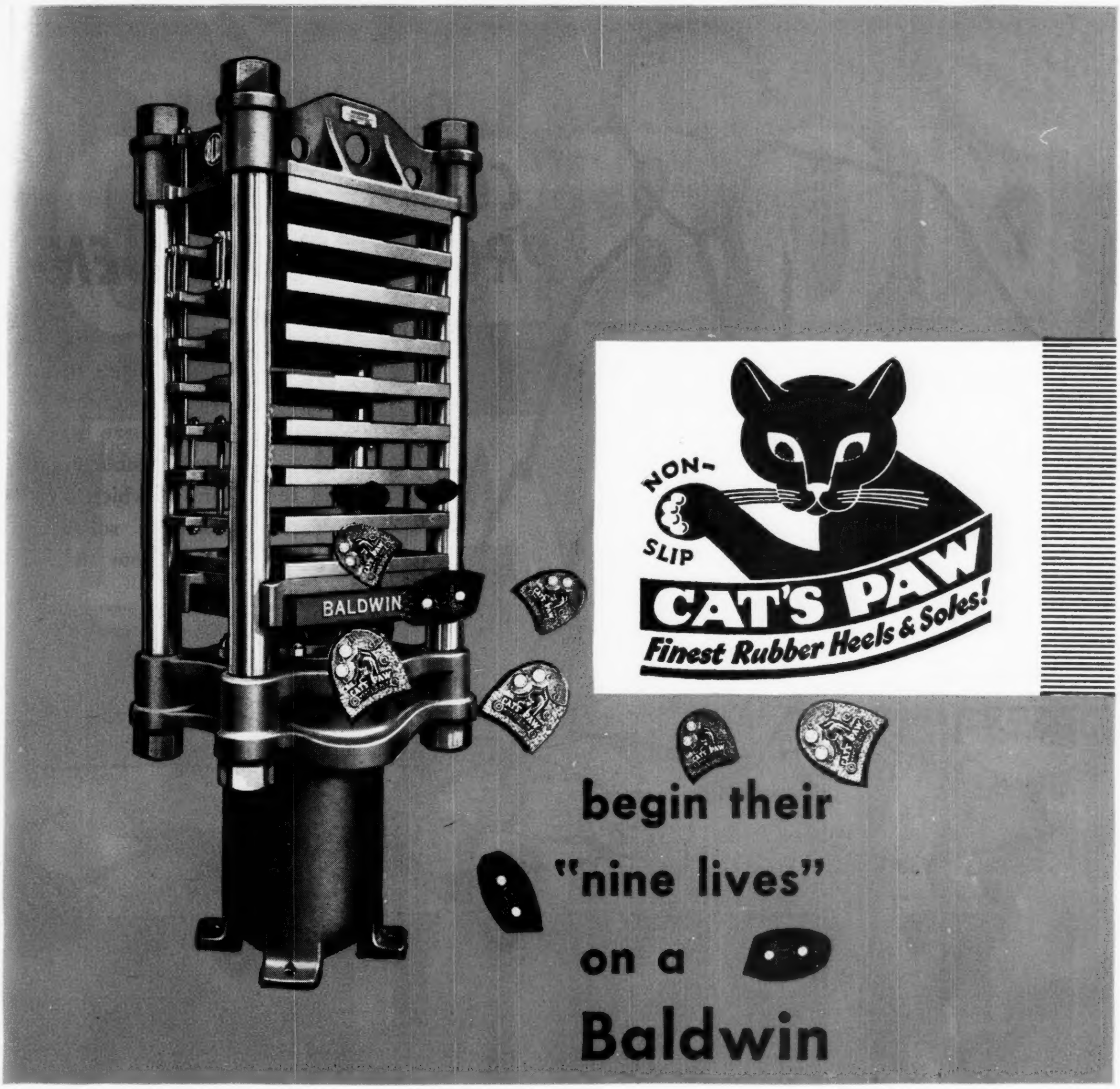
Name__________ Title__________

Company__________

Address__________

City__________ State__________

Interested in "Ludox" in__________
(*Type of product or products*)



begin their "nine lives" on a Baldwin press

In the manufacture of the famous "Cat's Paw" rubber soles and heels, Baldwin Steam Platen Presses help to maintain the high *production rate* required to satisfy national demand —and to maintain the *uniform quality* that keep Cat's Paw among the leaders in the field.

Baldwin Steam Platen Presses are invaluable aids in many process industries. They turn out top-quality products, reduce costs through production speed, assure profits through dependable performance. The design of these Baldwin Presses is the result of years of research and development, reinforced with practical experience gained in the field.

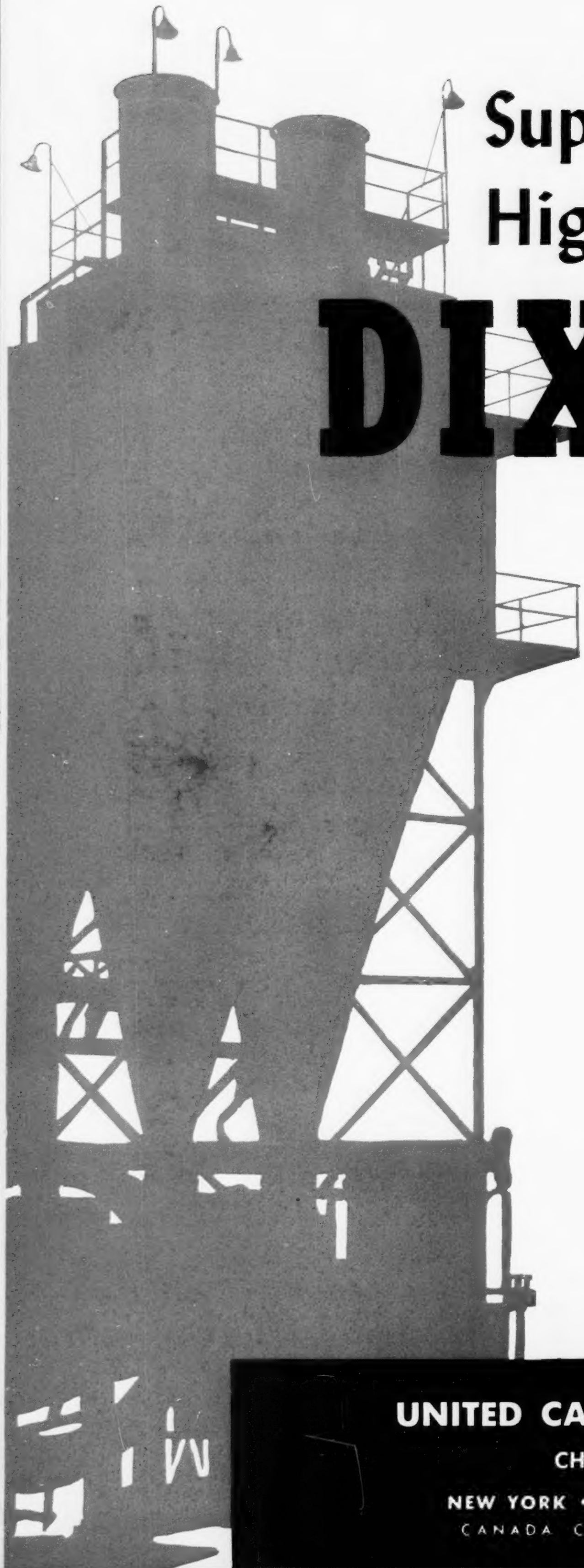
Features include low-stressed columns with an extra margin of safety—precision ground rams—drilled and ported steam plates, with the highest accuracy in alignment and finish—and simple, precise controls. Capacities, dimensions and features can be tailored to your specific needs. For a general description of the units, ask for Bulletin 254.

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A. Offices: Boston, Chicago, Cleveland, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Seattle, St. Louis, Washington. In Canada: Baldwin Locomotive Works of Canada, Ltd., Toronto, Ontario.

BLH THE BALDWIN GROUP

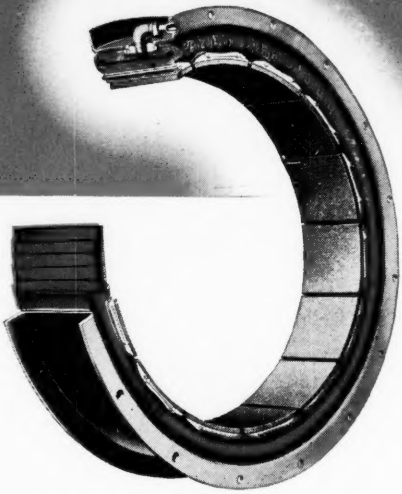
BALDWIN

HYDRAULIC PRESSES

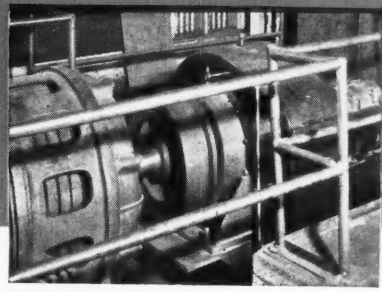


ONLY ONE MOVING PART

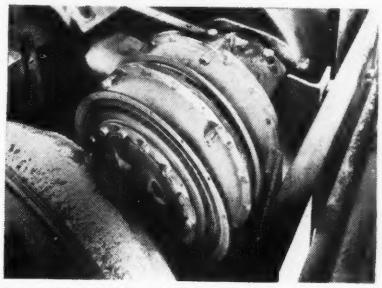
in this Fawick Clutch



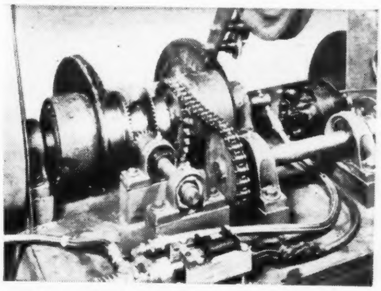
Fawick Airflex Clutch or Brake Type CB



Fawick Airflex Clutch & Brake used on drive of 60" Thropp Rubber Mill at Reeves Rubber Co., San Clemente, California.



Fawick Airflex Clutch & Brake on one 25 x 25 and one 24 x 26 Mill Drive at Dayton Rubber Mfg. Co., Dayton, Ohio.



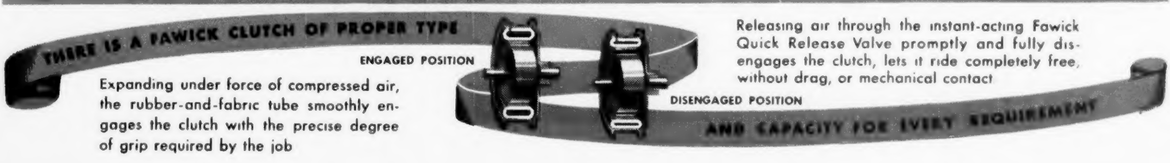
Fawick Forward and Reverse Clutches on Plastic Wire Covering Machine by National Rubber Machinery Co., Columbiana, Ohio.

The rubber-and-fabric pneumatic tube faced with friction shoe assemblies is the only moving part in this Fawick Clutch. This part naturally stays in perfect adjustment at all times—automatically compensating for wear of the friction shoes.

Job-tested, Fawick Clutches meet the toughest operating conditions in many fields—petroleum, earth-moving, metalworking, rubber, paper, pulp and others.

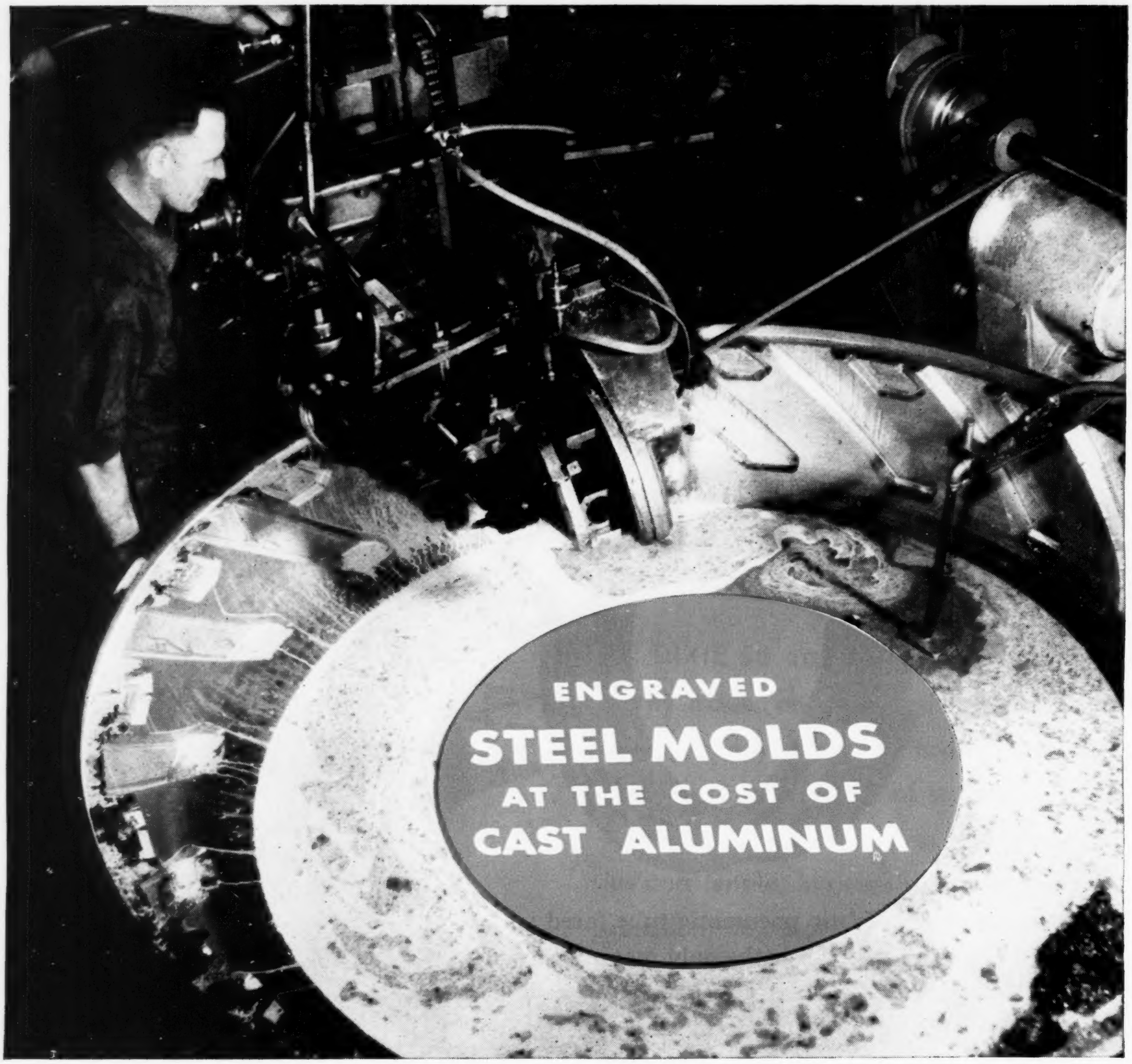
Write our engineering department for a recommendation of the Fawick elements best suited for your machines. Address Dept. IR.

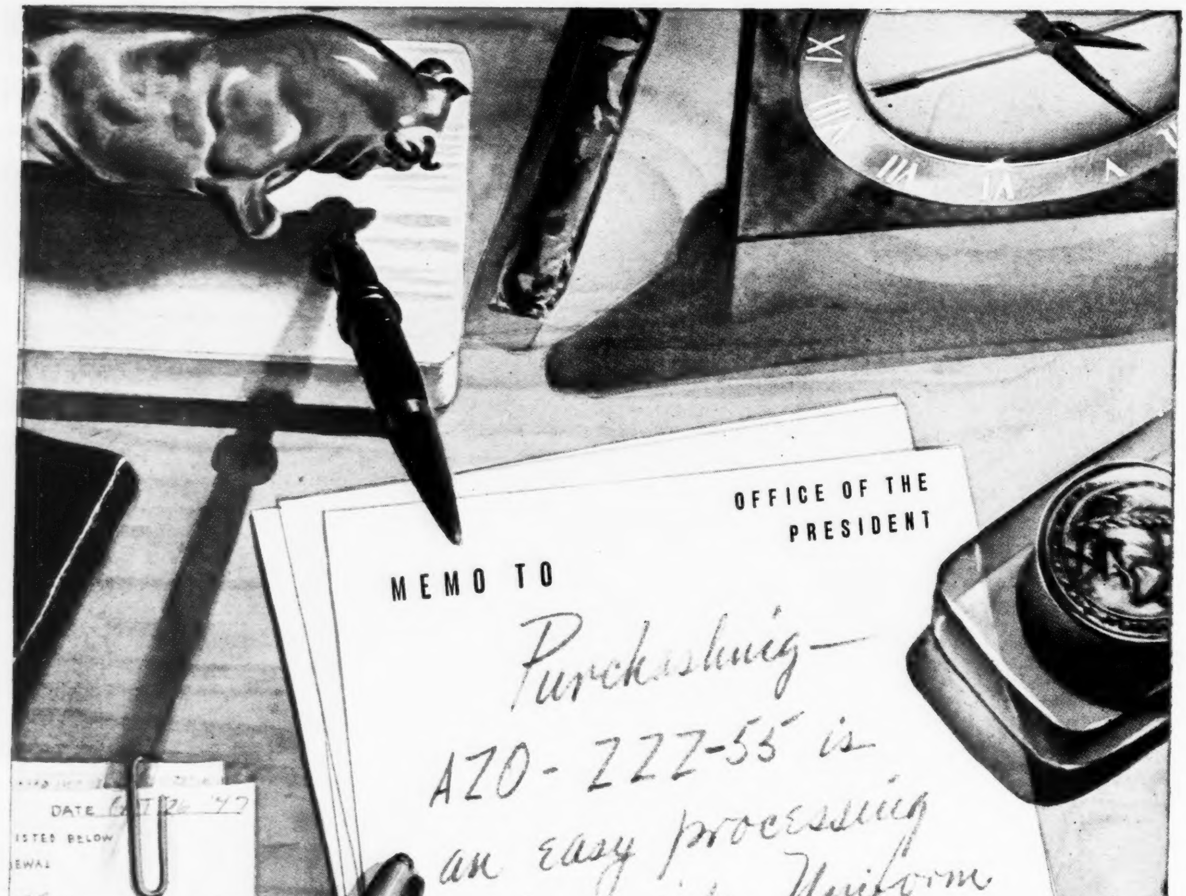
FAWICK *Airflex* CO., INC.
9919 CLINTON ROAD CLEVELAND 11, OHIO

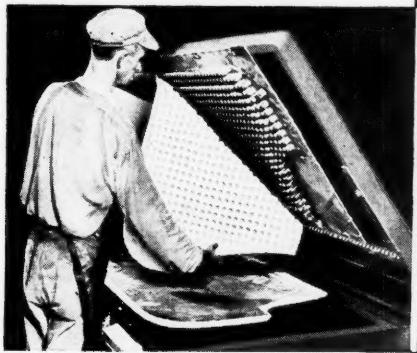


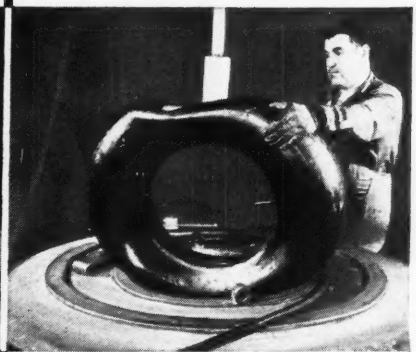
Expanding under force of compressed air, the rubber-and-fabric tube smoothly engages the clutch with the precise degree of grip required by the job

Releasing air through the instant-acting Fawick Quick Release Valve promptly and fully disengages the clutch, lets it ride completely free, without drag, or mechanical contact


ENGRAVED
STEEL MOLDS
AT THE COST OF
CAST ALUMINUM


OFFICE OF THE PRESIDENT
MEMO TO
Purchasing—
AZO-ZZZ-55 is an easy processing zinc oxide. Uniform particle size and absence of extreme "fines" assures good dispersion in rubber.
E J Meyer





Rubber Lubricants to fill every need

Polyethylene Glycols
"Carbowax" Compounds
Trade-Mark
"Ucon" Lubricants
Trade-Mark

They *leave little residue ....*
are water-soluble ....
are less volatile than glycerine ....

Polyethylene glycols, CARBOWAX compounds, and UCON lubricants have three outstanding advantages as rubber release agents and lubricants:

1. They offer a wide choice of products to meet particular requirements.
2. They leave a minimum of residue in the molds, resulting in longer operation before shut-down for cleaning purposes.
3. They are water-soluble, permitting easy application and removal.

These lubricants are used to treat tire bags for tire molding and to release many types of molded rubber objects such as hose cured on mandrels, sponge and foam rubber products, shoe soles and heels, extruded products and battery cases. They are also excellent lubricants for rubber shackles and joints and for rubber machining operations. Effective anti-stick agents for piled rubber slabs are formulated with these products. Water insoluble UCON lubricants are also available which are desirable in many applications.

All of these products may be used with or without other materials such as wetting agents, mica, clay, and organic solvents.

For more information about these polyalkylene glycol lubricants write Department M-10 for the booklets, "CARBOWAX Compounds and Polyethylene Glycols" and "UCON Fluids and Lubricants."

"Carbowax" and "Ucon" are registered trade-marks of C.&C.C.C.

CARBIDE and CARBON
CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities
In Canada:
Carbide and Carbon Chemicals, Limited, Toronto

How to make a *Stronger bond* between rubber and fabric

MORE STRENGTH HERE. Pre-treatment of the tire fabric with Resorcinol Adhesives in the latex mixture assures a stronger bond between the fabric and the tread.

TIRES, belting and other products which include laminations of rubber and fabric or cords are serviceable only as long as the parts hold together. To obtain best adhesion of rubber to fabric or cords, it is common practice to pre-treat the fabric in a mixture of rubber latex and some adhesive material. For this purpose adhesives prepared with Koppers Resorcinol are proving highly successful.

Recent tests have shown that Koppers Resorcinol Adhesives used in the pre-dip treatment produce a much stronger bond than casein. This is true with cotton, rayon and nylon fabrics but the most marked improvement is shown on the rayon and nylon.

You can prove this for yourself in your own laboratories. Write for a sample of Koppers Resorcinol and a copy of our Technical Bulletin.

KOPPERS

KOPPERS COMPANY, INC.
Chemical Division
Pittsburgh 19, Pa.

TITANOX-A

improves the Rubber Mask that improves the Video picture

This rubber television mask acts primarily as a shock absorber, of course. Yet experience has shown it actually improves the visibility of the video picture.

In the mask, as in many other rubber products, TITANOX-A (titanium dioxide) contributes high reflectance and *lasting* whiteness.

Whether the natural or synthetic rubber you compound is for television masks or white sidewalls . . . colored bathing caps or bright beach balls . . . you can depend upon TITANOX titanium dioxide or composite titanium calcium pigments to impart the desired degree of whiteness or clarity of tint . . . brightness . . . complete opacity or controlled translucency.

You are always welcome to discuss with us your problems in white pigmentation of rubber. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; 104 So. Michigan Ave., Chicago 3, Ill.; 2600 So. Eastern Ave., Los Angeles 22, Calif. Branches in all other principal cities.

®
TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

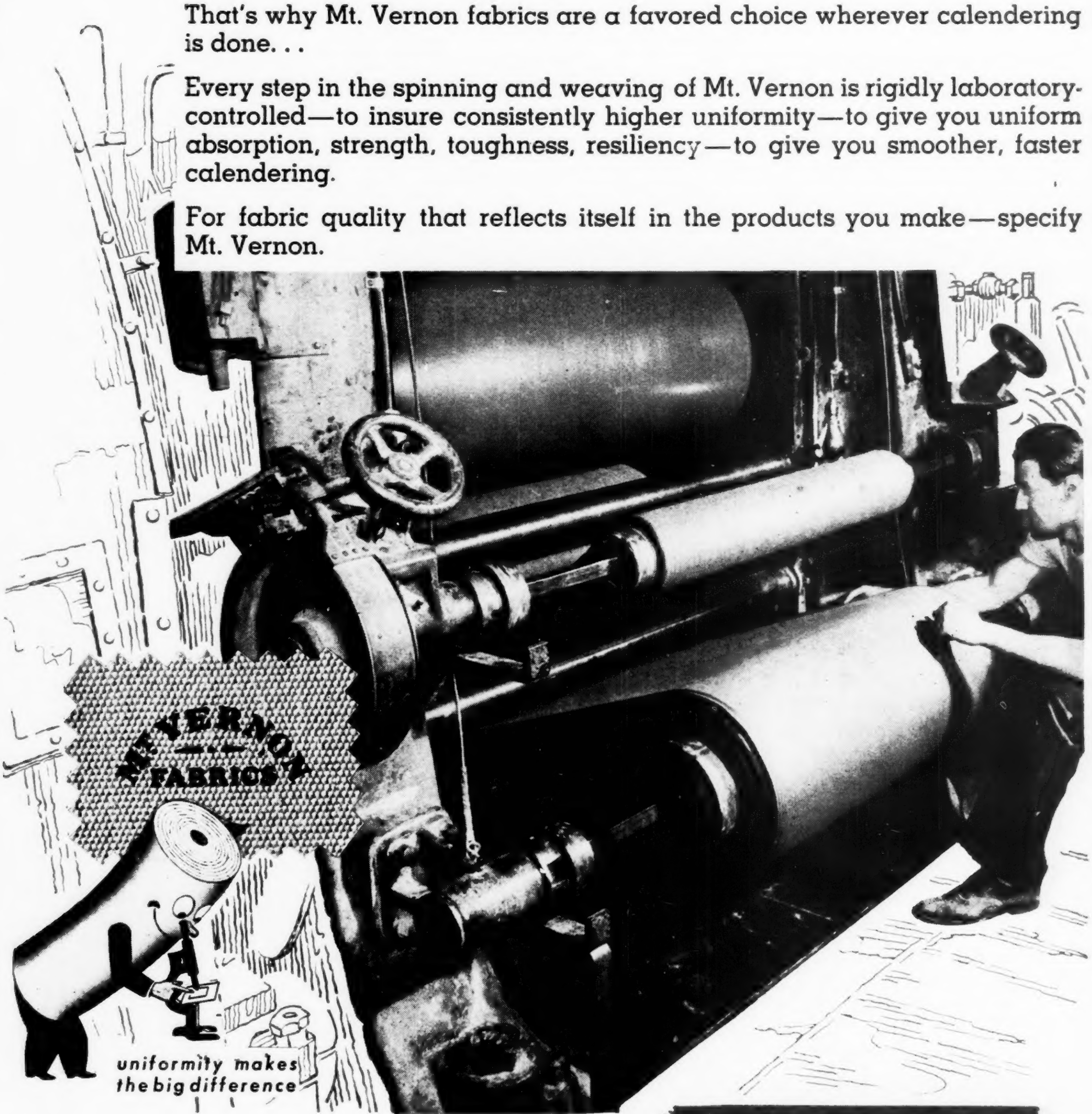
Mt. Vernon's Greater Uniformity Helps Calendering Efficiency

Uniformity of the fabrics you use means a great deal to the smooth, uninterrupted operation of your calendering machines. . . .

That's why Mt. Vernon fabrics are a favored choice wherever calendering is done. . .

Every step in the spinning and weaving of Mt. Vernon is rigidly laboratory-controlled—to insure consistently higher uniformity—to give you uniform absorption, strength, toughness, resiliency—to give you smoother, faster calendering.

For fabric quality that reflects itself in the products you make—specify Mt. Vernon.



Mt. Vernon-Woodberry Mills

TURNER HALSEY COMPANY
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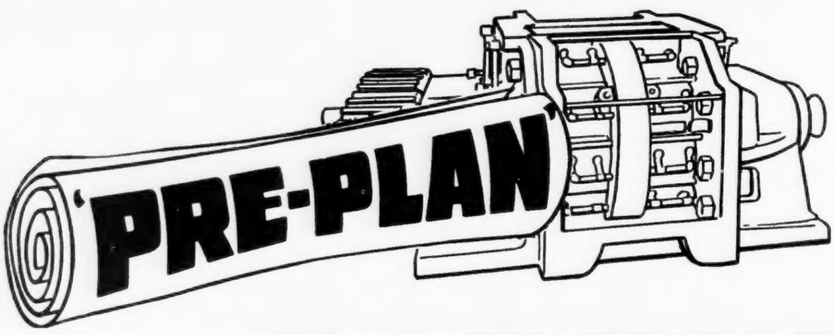


BANBURY SERVICE

Sets New Standards For Production Economies

When announced over a year ago, in June, 1948, our "Pre-Plan" Banbury rebuilding service met quick and favorable response from Banbury owners. They welcomed the unequaled savings in production time thus made possible, plus the precision workmanship and exclusive features always assured in an INTERSTATE job.

Now, perfected to still greater efficiency, our service today is recognized, and followed, as a leading factor in economical Mixing Room production.

"Pre-Plan" means a Banbury body in tip top condition returned to your production line WEEKS sooner than you thought possible. It means a guarantee against dust and material leakage for one full year. It means longer service benefits from our unequaled abrasion-resistant hard-surfacing of rotors and mixing chamber.

Now more than ever you seek greater Mixing Room efficiency. Now more than ever you can benefit from our 15 years' specialized experience in repairing and rebuilding Banburys. Let us show you, without obligation, what "Pre-Plan" will do for you.

FREE To Banbury Owners

To demonstrate the unequaled abrasion-resistant material we use in hard-surfacing rotors, rings, and mixing chamber, we will send FREE to any Banbury owner a unique tool you can make very useful in home or office. Just request on your company letterhead.

SERVING THE RUBBER INDUSTRY

IWS

INTERSTATE WELDING SERVICE

Main Plant: 914 Miami Street . . . AKRON 11, OHIO . . . Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

Chemicals you live by . . .

LUBRICATED FOR EASY MILLING

. . . that's SUPER MULTIFEX

Each ultra-fine particle (.03-.04 micron) of SUPER MULTIFEX is double-coated with an organic compound . . . once before drying, once after. This coating acts as a lubricant to aid dispersion of your milling process.

SUPER MULTIFEX, an exclusive product, is one of three grades of ultra-fine, non-abrasive, precipitated calcium carbonate offered by Diamond. Like the other two—MULTIFEX and MULTIFEX MM—it will add "muscle" to light-colored rubber products, imparting high tensile strength and resistance to tear (hot and cold) as well as low modulus and good flexing properties.

In plastics, MULTIFEX improves scratch resistance, light stability and hardness.

Which member of the MULTIFEX family is best for your products and processes is something we'll be glad to help you decide. Why not get in touch with our nearest office or distributor?

MULTIFEX NOW SOLD THROUGH

DIAMOND SALES OFFICES: Boston, New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis, Wichita, Oklahoma City and Houston.

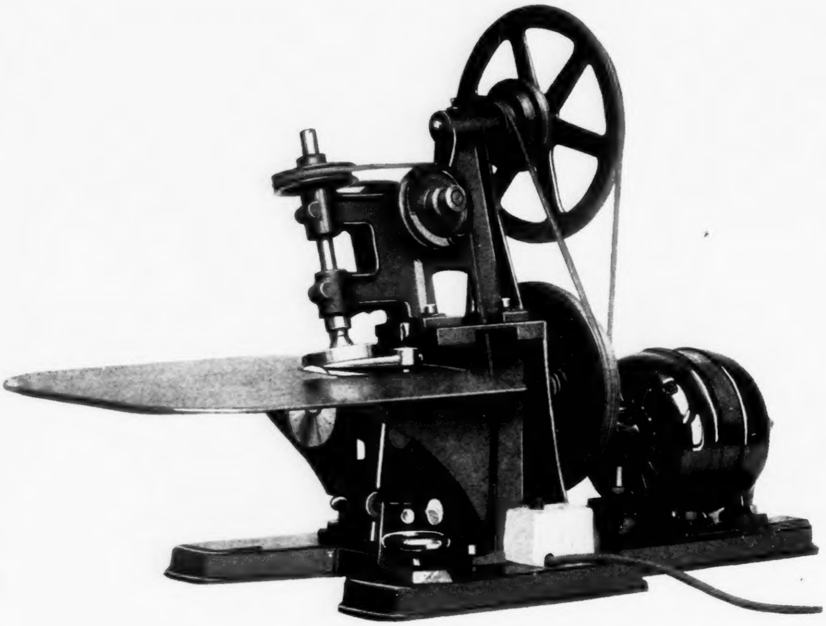
DIAMOND DISTRIBUTORS: C. L. Duncan Co., San Francisco and Los Angeles; Van Waters and Rogers, Inc., Seattle and Portland; Harrison and Crosfield, Montreal and Toronto.

DIAMOND CALCIUM CARBONATES

DIAMOND ALKALI COMPANY...CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

T. W. MORRIS TRIMMING MACHINES



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**Water Bottles,
Syringes,
Bathing Caps,
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Practical Aspects of Factory Scorch Control[1]

Douglas Chalmers[2]

WE ESTIMATE, in the absence of official figures, that the rubber industry's annual bill for direct scorched (prematurely vulcanized) material waste is in the order of five to ten million dollars. This range is not impressive for a three-billion dollar industry, until the waste figure is recognized to be probably one-third to one-half of the industry's annual bill for accelerators. Since a dollar of waste is a dollar of profit lost, it is even more sobering, in this present-day period of increasing competition, to realize that this loss is equivalent to 3% to 5% of sales.

Our approximations are based upon relatively tangible direct losses in "burnt" or "lumpy" raw and processed material. We can only speculate upon the additional intangible wastes associated with scorchy compounds, such as scheduling delays, equipment down-time, labor guarantees, product defects, and service failures.

Scope of the Problem

This paper describes a factory-scale scorch control program—an approach notably lacking in existing publications. It covers the manner of selecting one of the many previously reported methods of scorch testing for use in this factory-scale program. Useful approximations for minimum necessary resistance to scorching are supported by data on practical factory compounds processed in volume on a factory scale. Correlations are suggested between scorch test data and factory losses. This practice permits approaching the problem of scorch prevention and control by economic reasoning.

Literature Survey

The scorch control problem has not lacked attention in the past. Solutions have been sought in the fields of accelerator chemistry research, compounding and processing, test methods, and equipment design and operation.

Chemical Research on Accelerators

Thirty years of organic accelerator research up to War II is available in publications by Naunton, Baird, and Banbury (1), Twiss and Jones (2), Shepard (3), Cadwell and Temple (4), and Harman (5). In this period accelerator families and radicals were comprehensively classified, and successive emphasis upon improved properties of vulcanizates, increased speed of cure, reduced toxicity, improved aging, reduced scorching tendencies, and anti-scorching agents were recorded in the literature (31). This period culminated in the widest use of mercaptobenzothiazole and its derivatives for the best balance of properties and processing safety (1-2, 4, 6-8). A particularly useful landmark in the search for better balance between increased rate of cure and tendency to scorch was attained through chemical modification of the mercaptobenzothiazole accelerator in the condensation product of mercaptobenzothiazole and cyclohexylamine (5).

Accelerator and Retarder Compounding

A logical consequence of limitations encountered in single accelerator usage (1, 7-8, 27) for optimum balance of properties and processing safety, has been the study of accelerator combinations. Davies (9) suggests pairs and triplets for good cures and delayed action at processing temperatures. Acid salts of diphenylguanidine and thiurams in combination with thiazoles are proposed by Jones (6). Naunton *et al.* (1) compare single accelerators and combinations.

Thies (10), Naunton, *et al.* (1), Jones (6), Twiss and Jones (2), and Cadwell and Temple (4) review the use of organic acids and their derivatives, as chemicals or softeners, in the role of anti-scorching agents or retarders. The important distinction is made between simply permanent suppression of cure and the ideal of delayed acceleration for processing safety. Delayed action for better cured properties with greater processing safety has been the ideal in accelerator research and accelerator and retarder compounding (1, 2, 4, 6, 8-9). The compounder has been well equipped with bulletins from chemical suppliers which recommend use of certain accelerators and retarders for special processing or service problems.

Processing and Equipment Factors

Detailed published data on processing, equipment, handling procedures and standards are scarce. Naunton *et al.* (1) discuss the problem of processing equipment

[1] Presented before the Division of Rubber Chemistry, A. C. S., Boston, Mass., May 25, 1949.
[2] Gates Rubber Co., Denver, Colo.
[3] Numbers in parentheses refer to Bibliography items at end of this article.

cooling with respect to refrigerated water, larger roll coring, spray and immersion cooling.

Davies (9) reviews processing and equipment factors related to accelerator selection, i.e., processing and in-process storage. He points out the need of a safety factor in view of the practical problem of recycling stocks. The logical preference is pointed out for compound adjustment to fit equipment rather than *vice versa*, wherever possible. Jones (6) cites these recognized processing and equipment aids in minimizing scorch losses: low mixing temperatures, good heat transfer, adequate low temperature cooling water, equipment spray cooling, prompt quenching, minimum calendering friction ratios and stock banks, etc. He also refers to the double batch system of splitting powerful curatives, as well as the important role of liberal softener usage, and optimum sulfur and accelerator ratios. The Vanderbilt Handbook (11) reiterates recognized general processing precautions related to mixing, calendering, and extrusion.

Test Methods

The preponderance of literature on the subject of scorching is principally concerned with the development and comparison of test methods. Table 1 represents a classification of published methods by type, apparatus, general operating conditions, and reported or observed advantages and limitations. The weight of evidence from the literature seems to favor the use of the Mooney plastometer (11-13) for all around balance in speed, simplicity, temperature control, good reproducibility, and sensitiveness to incipient scorching.

TABLE 1. LITERATURE SURVEY OF VARIOUS SCORCH TEST METHODS

Property Change and Apparatus	Scorch Point or Index	Features and References
Chemical		
Combined sulfur	0.8% combined sulfur out of 2.5% total	Cumbersome. Sulfur content unrelated to properties (8-9)
Physico-Chemical		
Solution solubility	Relative refractive index or turbidity of solutions *vs.* control.	Cumbersome. Initial scorch point hard to pick up (2, 14-16, 26)
Gelling		
Oven heated solvent solutions	Relative gel-appearance, time and gel character	Cumbersome. Inaccurate. Insensitive to initial set up (2, 16)
Physical		
Stress Strain		
Modulus		
Tensile machine tests on samples cured at relatively low temperatures	Relative modulus increase *vs.* control	Modulus affected by loading. Equal modulus not necessarily index of equal rate of cure (8)
Tensile		
Tensile machine test on samples cured at relatively low temperatures	Relative tensile increase *vs.* control	Comparisons affected by loading. Two or more cures required to fix rates (7, 17)
Elasticity		
Parallel plate plastometers	Plasticity or recovery changes	Difficult sample control. Good measure of plasticity changes (17-18)
Glycerol heating both for small samples and probing rod	Probing rod indicates crude state and degree of sample set-up	Quick - but insensitive to initial set-up due to human variables (2)
Retraction speed and return of folded slab	2-second and 60-second return noted on arc scale	Quick – insensitive – affected by sampling factor (19)
Plasticity		
Parallel plate Plastometer	Relative pellet recovery *vs.* uncured or optimum cured control sample	Slow, sampling variables, compound loading effects (2, 6, 7, 14, 17)
Extrusion tubability	Extruded volume or weight effects from scorching. Relative roughness	Slow, insensitive, difficult temperature control. Affected by stock load. Representative (7, 17)
Mill and Banbury performance	Scorching obvious from roughening, heat build up, crumbling	Representative. Not precisely controllable. Some human element (7, 16, 20-21, 30)
Mooney plastometer	Initial viscosity increase from minimum, time to rise to 10 pts. over minimum, or time to reading 100	Simple, fast, repoducible, good temperature control. Does not reflect the heat generated due to stock loading or processing (11-13, 21)

Factory Experience and Standards of Scorching Performance

In the field of factory experience and standards of scorching performance, particularly, there is an obvious lack of useful published data. Odenwald and Baader (17) and Morley *et al.* (16) predict factory extrusion scorching difficulties if a stock shows a 40% increase in "deformation hardness." This term is the load to reduce to four-millimeter height a 10-millimeter diameter pellet, 10 millimeters high, in 30 seconds after 10 minutes' aging at 230° F.

Davies (9) predicts possible scorching difficulty if combined sulphur is in the order of 0.8% out of 2.5% total sulphur, following a cure of 20 minutes at 240° F.

Weaver (12) predicts possible factory scorching problems if compound Mooney readings reach "100" in 10-12 minutes at 250° F. From his data this would correspond to about 5-6 minutes at 250° F. based upon the more usual (13) one-point rise in Mooney readings from the minimum.

Laboratory scorch test temperatures have been in the range of 212-230° F. (Table 2). Practically all references before War II considered this temperature range representative of usual processing conditions. Weaver (12) and Shearer *et al.* (13) more realistically accept 250° F. as representative of factory processing temperatures.

TABLE 2. LITERATURE SURVEY OF "REPRESENTATIVE PROCESSING TEMPERATURES" PROPOSED FOR LABORATORY SCORCH TESTS

Author and Reference	Publication Year	"Representative Processing Temperatures" ° F.
Naunton, *et al.* (1)	1934	212-230
Davies (9)	1934	240*
Twiss, *et al.* (2)	1935	220
Jones (6)	1936	212-230
Buchan (7)	1937	212-245
Vanderbilt News (20)	1938	220
Weaver (12)	1940	250
Menadue (19)	1944	212
Shearer, *et al.* (13)	1947	250

*Concluded to be well above usual processing temperatures!

Recent Factors Related to Factory Scorching Performance

More than 10 years have elapsed since there has been published even a general survey of the practical aspects of scorch performance and actual control (1-2, 6, 8-9, 17) as distinct from simply the measurement of scorch (12, 13, 19, 21). In addition to this fact, other elements, such as those listed below, have appeared to warrant reviewing compounding principles, processing performance, standards and safety factors, and the adequacy of compounding materials.

1. FASTER PROCESSING SPEEDS. Because of faster processing speeds, higher processing temperatures characterize mixing, extrusion, and calendering operations today (22). Spanning 10 years, we observe a 20 to 25% increase in calendering speeds and a 15 to 20% increase in overall extrusion rates. Individual cases range from 10 to 50% higher than prewar. More horsepower, heavier machines, automatic controls, labor saving materials and handling devices have made these increased processing speeds possible. No new compounding materials or compounding principles, however, have been made available to adjust formulae for these new processing conditions.

2. INCREASED USAGE OF INTERNAL MIXERS. Compounds and factories are exposed to 225 to 300° F. Banbury dump temperatures which enjoyed the safe 170 to 190° F. mill mixing and warm-up temperatures prewar. Dump temperatures in excess of 300° F. on fully compounded stocks are not unusual today.

3. Fast and Tight Curing Compounds. There is a continuing need of this type of compound in the face of increasingly severe dynamic demands upon compounds for tires, belts, and molded parts. Cost reductions are the order of the day and demand faster vulcanizer and mold turnover.

4. Use of Cure Activating Furnace Blacks. The interesting processing and service properties obtained with the new reinforcing furnace blacks come at the price of a decreased margin of processing safety, particularly when used in natural rubber (23-25).

An additional factor, if a less tangible one, aggravating recent scorching control problems, has been the industry's continued use of slow curing, more scorch-resistant GR-S during the past three or more postwar years. It was a frequent experience that the return to prewar natural rubber formulae was accomplished by factory scorching problems far greater than could be recalled before the war. We find it difficult to determine whether this rather common experience has been due to: (a) the higher processing speeds referred to; (b) loss of worker skill; or (c) simply more organizational consciousness of scorching losses.

The lower plasticity and faster rate of cure of natural rubber recently available *versus* that experienced prewar has been suggested as a cause. At least in our case, review of recent and prewar data for plasticity and cure failed to show differences significant enough to explain more costly postwar scorching experience.

The Factory Scale Approach to Scorch Control

In a factory scale approach to the problem of scorch control careful, but prompt study was needed to reduce scorch losses within the limits of product quality and manufacturing efficiency. In a plant employing several hundred formulae to manufacture nearly a thousand consumer and industrial specialty products the "test tube" approach was clearly out of the picture in the initial stages.

The following guided us in our early study of the factory scorching problem:

A. The factory as a whole would be our "test tube" for the initial task of establishing good *versus* bad scorching performance.

B. An "ounce" of demonstrated factory performance, with all its admitted variables, was worth a "pound" of isolated and unrelated measuring precision.

Some 40 production compounds were selected for intensive study with respect to factory scorched scrap losses, laboratory scorching data, cure rate, polymers, and processing operations. The compounds selected represented typical tire, inner tube, repair materials, V-belt, hose, and molded applications. Polymers represented were natural rubber, standard GR-S, Butyl, Neoprene GN, typical nitrile rubbers, and "Thiokol." Processing operations represented Banbury mixing; tread, hose, and molded goods extrusions; gum, friction, skim, and inner tube calendering.

These scrap performance data were available over periods of several months and included hot and cold weather experience. Curing rate and laboratory scorch data by various tests were correlated with loss records. An early problem, therefore, was to decide upon a laboratory test method with reasonable reproducibility and universal comparability.

Selection of a Scorch Test Method

In the initial stages of our attempt to establish scorching performance standards, equal weight was attached to laboratory scorching data based upon:

A. Stress/Strain Properties With Samples Cured At Relatively Low Temperatures, i.e., 10- to 40-minute cures at 220° F.

B. Tuber Scorch. A #1 Royle tuber, maintained at 250° F. barrel and head temperature, was used to recycle the test stock through a crescent die with sharp edges. Approximately 400 cubic centimeters of stock were required. The operator reports the time to observe "light," "medium," and "heavy" scorching. These degrees of scorching are reflected by relative roughness, edge tearing, and graininess of the extruded sample.

C. Mooney Plastometer Scorch. Generally, reasonable correlations among the above mentioned tests proved unsatisfactory, although parallel trends could be observed.

Ratings based upon multiple indices such as low temperature stress-strain proved cumbersome; while a single cure unduly reflected modulus and reinforcement factors.

The tuber scorch test has been particularly valuable for special processing evaluations involving highly reinforced or loaded compounds customarily subjected to recycling. In such cases the amount of heat generated during factory processing is generally reflected in the tuber scorch test results. The test over a period of months, however, failed to furnish the degree of simplicity and reproducibility required, since multiple readings affected to some extent by operator variables did not permit the universal comparison of results which we desired.

The Mooney Scorch Test Employed

The operating conditions, using the Mooney scorch test, arrived at after several months' intensive experience by compounders, processing and test methods engineers were as follows: Large rotor, 2-minute warm up, 250° F., platen temperature. The time to scorch is taken to be the first definite rise from the minimum. This would be close to the one-minute rise referred to by Shearer *et al.*

Some investigators have indicated a preference for using the small rotor (12-13). Suppliers' bulletins indicate some prefer "time to 10 point rise" as more clearly read from Mooney scorch data. Weaver (12) recommends time to "reading 100" as the appropriate scorch time.

Our study of the effect of "large" *versus* "small" rotor indicates that adding three minutes to large rotor readings is a reasonable correction for normal curing stocks at test temperatures in the order of 240 to 300° F. (Table 3). For extremely fast scorching stocks a correction is hardly necessary. For extremely soft and slow scorching stocks, a 4-6-minute addition for small rotor scorching time appears proper.

Table 3. Typical Mooney Scorch Time from Large (LR) *vs.* Small Rotors (SR)

		Rise above Mooney Minimum			
		One Point		10 Points	
Compound Type	Scorch Test Temperature °F	LR	SR	LR	SR
Hi-load reclaim hose tube	212	22	25	33	40
	225	12	15	17	21
	250	5	5	6	7
Neoprene hi-speed solid tire	212	2	3	3	6
	225	2	2	2	3
	250	1	2	2	2
V-belt friction	250	9	11	14	20
Natural rubber stock "A"	250	12	14	14	16
"B"	250	16	17	24	27
GR-S tread type	250	12	13	17	18
General-purpose moldings	250	10	12	14	17
Fast cure steam hose tube	250	2	2	3	5

Scorch times taken at one-point rise above Mooney minimum, *versus* 10-point rise, *versus* "reading 100" can be roughly correlated by the ratios 1.5 and 2.0, re-

spectively. The relation, "1.5 x minutes to 1-point rise = minutes to 10-point rise," was well supported by good correlation with 33 different types of compounds. These ranged up to 30 minutes' time to scorch, tested at temperatures from 212 to 300° F. As would be expected from the arbitrary "reading 100" index, wide variations from the correction factor 2.0 were observed.

Time-Temperature Coefficient of Scorching

This interesting coefficient, which enables accomplishing time-temperature corrections, has been the object of much study in the literature (Table 4). Relative scorch results at different temperatures for nearly 40 compounds, from our data and those reported in the literature, justify employing the factor, 2.0, for a practical time-temperature scorching coefficient.

Table 4. Comparison of Various Time-Temperature Coefficients of Scorching

Reference and Compound Types	Scorching Coefficient	Scorch Test and Temperature Range—°F.
Weaver (12)		Mooney
Unspecified N. R.	over 2.2	212-230
Unspecified N. R.	2.1	230-285
Unspecified neoprene	2.2	230-285
Shearer, Juve and Musch (13)		
GR-S tread	2.0	280-330
Natural rubber tread	1.9	250
Gates Rubber Co. Data		
GR-S tread	2.0	250-300
N. R. tread	2.1	235-265
N. R. tread	2.0	265-295
N. R. sandblast hose tube	2.1	235-295
N. R. steam hose tube	2.2	235-295
Reclaim high load hose tube	2.2	212-250
Neoprene high speed solid tire	1.6	212-250
Natural Rubber Accelerator Evaluations		
		Modulus and Combined Sulphur
Eliel (8)	2.1 ± .3	180-230
		Combined Sulphur
Davies (9)	2.3 ± .3	240
		Solubility and Turbidity
Thies (10)	3.0—3.3	180-210
	2.1—2.5	210-236
	1.8—2.0	236-266
		Williams Plastometer
Morley, Scott, and Willett (16)	2.0	212
Buchan (7)	4.0—1.5	212-248

Shearer *et al.* (13) point out how this factor changes with different types of stocks and suggests scorch correction techniques. For the purpose of time-temperature comparisons of scorching and processing behavior it does not appear warranted to classify usual compounds by a coefficient significantly different than 2.0 ± .1. The coefficient has been shown to vary at temperatures outside of the range 230 to 300° F. (6-7). Exacting comparisons of accelerator delayed action effects for research evaluation purposes doubtless would require more careful determination of individual coefficients.

Based upon the most probable case of a time-temperature coefficient of scorch of 2.0, Figure 1 is possible. This chart enables practical estimates of safe *versus* marginal processing situations with stocks of known scorch characteristics and where seasonal and processing temperature effects are known. This logarithmic chart

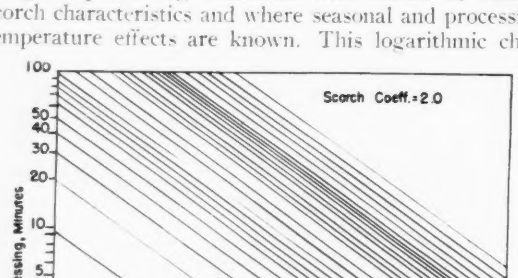

Fig. 1. Safe Processing Time *vs.* Mooney Scorch

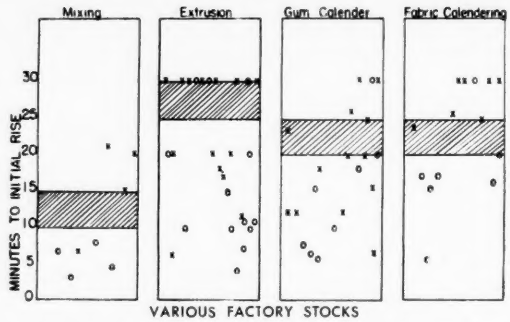

Fig. 2. Good (x) and Bad (o) Factory Scorch Performance *vs.* Minutes to Initial Mooney Rise from Minimum (Two-Minute Warm-up Platens 250° F.)

depicts the conventional time-temperature relation of the type encountered in curing time and temperature adjustments (28-29) and in certain chemical reaction rate calculations. The minutes to Mooney scorch at 250° F. for any compound represent a point on this chart. The ordinate, "Safe Processing, Minutes," can represent either Mooney time or length of safe factory processing.

The "Safe Processing, Minutes" can be read off this chart's ordinate. This value corresponds with the intersection of a sloping line from the point of the experimentally determined Mooney scorch value with the vertical line from any actual factory processing temperature. Although enough cases to claim proof are lacking, this chart has been used to predict, reasonably successfully, the heat history life of a compound of known scorch rate which was subjected to successive reprocessing under known times and temperatures.

Factory Scorch Performance Standards

A correlation of Mooney scorch with actual factory scorching performance on various processing operations is represented in Figure 2. The approximate relations of Figure 2 make possible setting these minimum Mooney scorch standards for reasonably trouble-free factory operation.

1. Banbury mixing, 10-15 minutes.
2. Extrusion, 25-30 minutes.
3. Gum calendering, 20-25 minutes.
4. Fabric calendering, 20-25 minutes.

These minimum Mooney scorch standards are useful general bench marks. They do not imply that, owing to special skills, equipment, or peculiar compounding combinations, stocks cannot successfully be run with lower scorch resistance than suggested above. These figures simply mean that, without special compensation, some factory scorching difficulty can be expected if scorch times are lower than the minimum suggested.

In general these levels seem to be consistent with private communications and bulletins we have received concerning compound scorch times associated with factory difficulty in plants of various sizes in the industry.

In interpreting the bench marks mentioned above, the higher value, all things being equal, probably represents the preferred standard. Take, for example, the subject of seasonal effects (Table 5). A year-round survey of typical factory processing temperatures indicated that, generally, compound storage and operating temperatures are 10 to 15° F. higher in the summertime than in the colder winter months. For example, a compound might display satisfactory factory scorch resistance on extrusion during the winter months and have a Mooney scorch rating of 25 minutes at 250° F. In the summertime the extruder operating temperatures might run 15° higher.

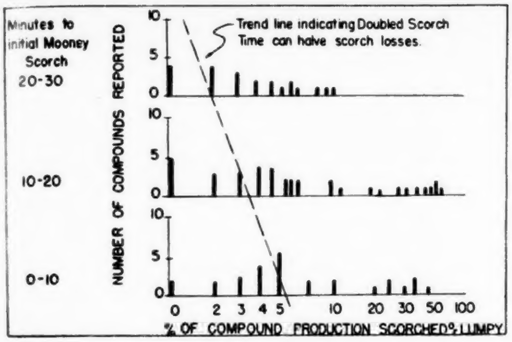

Fig. 3. Approximate Correlation Mooney Scorch *vs.* Factory Scorch Losses, Pounds

Although the basic Mooney scorch rating would not be expected to be different in the summer, as compared to the winter, the higher actual operating temperatures are equivalent to running the test at 265° F. From Figure 1, therefore, the safe processing time has been cut from 25 minutes down to the range of 16 to 19 minutes. This throws the stock's scorch resistance rating below the minimum time range suggested for extrusion operations. In significant confirmation of this hypothesis is the fact that our records indicate scorch losses are conservatively doubled during the hot summer months as compared to the cold winter months.

TABLE 5. SEASONAL EFFECTS UPON TYPICAL FACTORY OPERATING TEMPERATURES

	Range of Temperature Increases from "Cold" to "Hot" Seasons —°F.
Cooling water	20
General millroom ambient temperatures	25–30
Banbury dump temperatures	15–20
Mill roll temperatures	10–15
Dumped stock on sheet-off mills	No significant change
Stock on warm up mills	5–15
Extruded stock temperatures	10–20
Calender and extruder feed stocks	10
Calender banks	0–10
Stock into containers	10

Naturally, in interpreting the bench marks suggested above, the minimum range of scorch resistance for mixing is a sort of academic figure. Rarely do practical compounds undergo the sole processing operation of being mixed. Formula scorch resistance, therefore, should reflect the most severe standards which the processing sequences for that particular stock will require.

Relation of Compound Scorch Resistance with Actual Scrap Losses

In Figure 3 an approximate correlation has been attempted by plotting several months' hot and cold weather scorched or lumpy scrap performance *versus* the range of Mooney scorch times involved with the particular compounds. The general relation suggested is that doubling the time to scorch on the Mooney plastometer can "halve" the quantity of scorched stock losses in factory operations. This admittedly approximate relation has been proved to be on the very conservative side. Actual factory compounds adjusted to give double Mooney scorch time readings have shown well over a 50% reduction in scrap related to scorching.

Formula Considerations Related to Scorching

We have not been successful in establishing workably close correlation between scorch time and rate of cure as reflected by time to optimum stress-strain properties. The wide range of possible delayed action curative combinations inherently deny such a correlation. In Figure 4, however, is an interesting relation between time to optimum cure at 300° F. based upon stress-strain properties *versus* minutes to initial Mooney scorch. The curve shown represents the limiting scorch resistance that appears to be attainable with a fixed optimum cure time. This limiting curve has been tested not only by some 40 actual production compounds, but also for nearly 60 experimental variations. Thirty-five of these compounds represented competitive compounds and suppliers' recommendations involving maximum scorch resistance along with superior resistance to heat, aging, and dynamic-type testing.

Depending upon the type of service required of the compound, the limiting line for scorch resistance can be approached. Generally, formulae which must satisfy extremely high dynamic, aging, and heat resistance requirements fall significantly below this line at any optimum cure time. This statement reflects the usual experience that severe heat and dynamic service requirements lead to the need of extremely tightly cured stocks where maximum scorching resistance is frequently sacrificed.

A practical index of the "balanced" quality of accelerators or curative combinations is the extent to which the limiting line for scorch resistance can be approached while superior resistance to heat, flex cracking and heat generation, aging, and abrasion is maintained.

Examples of the Economic Aspects of Scorch Resistance Compounding

Case 1: Inner Tube Stock

The first situation represented extremely high scorch losses encountered in an inner tube stock. Substantial reduction in these losses was accomplished by the delayed action resulting from retarder usage. The added expense of the retarder was relatively small, resulting in a substantial net savings in scorched waste.

		Dollar Loss
Scorched stock per 1000# processed	=143 lbs.	$15.30
With retarder	=32.5 lbs.	3.51
Savings per 1000#		$11.79
Retarder cost per 1000#		3.22
Net savings per retarder cost per 1000#		$ 8.57

Case 2: Hose Cover Compound

A second situation represented undesirable, but moderate scorch losses in a hose cover compound. In this case the addition of a retarder accomplished some reduction in scorched stock loss, but the added cost of the retarder produced a marginal savings.

		Dollar Loss
Scorched stock per 1000# processed	=28 lbs.	$ 2.89
With retarder	= 6 lbs.	.69
Savings per 1000#		$2.20

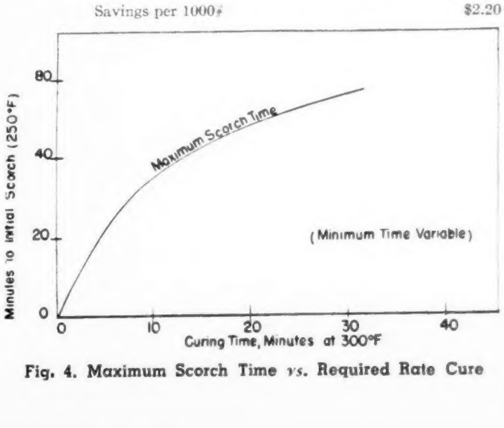

Fig. 4. Maximum Scorch Time *vs.* Required Rate Cure

But, scorched stock from either compound can be selectively reprocessed and worked away at a net recovery for 28 pounds per 1000 pounds of $1.90 value per 1000 pounds and for six pounds per 1,000 pounds of $0.40 value per 1,000 pounds.

Net loss without retarder	$2.89 − 1.90 = $0.99
With retarder	0.69 − 0.41 = 0.28
Actual net savings per 1000#	$0.71

Case 3: Butyl Inner Tube Stock

The third situation involved a Butyl inner tube stock wherein substantial scorch stock losses were being encountered. Compounding work indicated that a change in accelerator substantially increased the Mooney scorch time, but retarded the cure. From the relation of Figure 3, it was possible to estimate the expected scorch scrap with the new acceleration. Against this scrap saving could be compared the added costs of the new accelerator plus the amortization cost of molds required to maintain production in the face of a retarded cure. The data showed that merely making a change in acceleration was an uneconomic solution. The net cost was higher than continuing with the original scorch losses. This combination of technical and economic reasoning avoided unprofitable further study of accelerator adjustments and focused attention on the need of equipment and processing adjustments to maintain profitable inner tube production.

Scorch *vs.* Cure Rate *vs.* Mold Turnover

	Actual	Proposed
Acceleration	0.53 pts. Captax	1.0Altax
Optimum cure at 330° F.	6 minutes	7 minutes
Mooney scorch time	15 minutes	25 minutes
Scorched scrap per month	1500 lbs.	900*
Net excess dollar loss per month (allowing for available recovery)	$98.00	....
Turns per mold per 8 hrs. shift	70	60
Net tube production lost	....	140/shift
Monthly amortization of added molds to maintain production		$12.00
Added stock cost for Altax		162.00
Total cost per alternative		
Continue with scorch problem	$98.00	
Reduce scorch losses by acceleration change		$174.00

* Based upon the approximation of Figure 3 for scorch times involved in this problem, increasing this scorch time from 15 to 25 minutes reduces scorch scrap in the ratio slightly over 3 to 2. The 900 pounds is in this ratio with the actual originating scorch losses of 1,500 pounds.

These simple examples indicate that curative and retarder adjustments furnish certain economical solutions when losses are large. In such cases more careful curative adjustments generally accomplish the major savings. It has been our experience that the use of retarders is justified most frequently in the special case where, for special processing or property reasons, usual curative combinations are inadequate.

Summary

While recognizing the tremendous number of variables occurring in factory processing and testing operations, curatives still appear to represent the limiting factor in the ever-pressing problem of superior rubber product properties at lower cost and increasing factory efficiency. The Mooney plastometer, when used as a scorch test instrument, enables the establishment of approximate standards for reasonably scorch-free factory operations. The standards suggested and the reasoning possible from them should prove of value in practical formula and processing development, accelerator research and evaluation.

Acknowledgments

The findings reported represent the creative accomplishment of many assignments made to our compounders, processing and test methods development engineers. Particularly useful contributions of data, graphs, and manuscript presentation are acknowledged from U. Moore, D. Kutnewsky, J. Rugg, W. French, T. Bolt, M. Seaman, and J. Nassimbene, of the technical department. Permission of the Gates Rubber Co. to publish this paper is gratefully acknowledged.

Bibliography

(1) "Delayed-Action Accelerators." *Rubber Chem. Tech.*, 7, 417 (1934).
(2) "The Restraining of Vulcanization in Rubber Manufacture." *Ibid.*, 8, 230 (1935).
(3) "Onward March of Rubber." *Ind. Eng. Chem.*, 28, 281 (1936).
(4) "Accelerators. Their History and Use," pages 288-303 in "Chemistry and Technology of Rubber," edited by C. C. Davis and J. T. Blake. Reinhold Publishing Corp., New York (1937).
(5) "Vulcanization Characteristics of Mercaptobenzothiazole Derivatives." *Ind. Eng. Chem.*, 29, 2, 205 (1937).
(6) "Organic Accelerators and Problems Connected with Their Use in the Factory." *Rubber Chem Tech.*, 9, 1 (1936).
(7) "Mastication and Rate of Set-up—Part I." *Ibid.*, 10, 508 (1937).
(8) "The Effect of Organic Accelerators on the Temperature Coefficient of Vulcanization." *Ibid.*, 11, 101 (1938).
(9) "Some Observations on Accelerator Practice and Modern Compounding." *Ibid.*, 7, 641 (1934).
(10) "Scorch Retarders and Scorch-Retarding Materials." *Ibid.*, 5, 66 (1932).
(11) "The Vanderbilt Rubber Handbook—1948," pages 71-78. R. T. Vanderbilt Co., New York.
(12) "Determination of Scorching of Rubber and Synthetic Compounds by the Use of the Mooney Plastometer." *Rubber Age (N. Y.)*, 48, 89 (1940).
(13) "Measurement of the Scorch and Cure Rate of Vulcanizable Mixtures Using the Mooney Plastometer." India Rubber World, 117, 216 (1947).
(14) "An Accurate Method for Comparison of Scorching Qualities of Accelerators." H. R. Thies, *Rubber Chem. Tech.*, 2, 68 (1929).
(15) "Temperature Coefficient of Vulcanization." R. H. Gerke, *Ibid.*, 13, 255 (1940).
(16) "Comparison of Methods of Examining the Scorching of Rubber Stocks." *Ibid.*, 18, 460 (1945).
(17) "Problems and Aims of the Control of the Workability of Natural Rubber and Rubber Stocks," pages 347-61 in "Proceedings of the Rubber Technology Conference." W. Heffer & Sons, Ltd., Cambridge, England (1938).
(18) "Scorching and Other Plasticity Changes in Rubber Compounds on Heating." E. O. Dieterich, J. M. Davies, *Rubber Chem. Tech.*, 4, 552 (1931).
(19) "Setting-Up or Scorchability Test of Compounded Rubbers." *Ibid.*, 17, 213 (1944).
(20) "What We Mean by Scorch Tests." *Vanderbilt News*, 8, 5, 26 (1938).
(21) "Development and Standardization of Tests for the Processability of Rubber." R. H. Taylor, J. H. Fielding, M. Mooney, *Rubber Age (N. Y.)*, 61, 567, 705 (1947).
(22) "Stability of Accelerators as Affected by High Processing Temperatures." F. L. Holbrook, T. H. Fitzgerald, India Rubber World, 117, 761 (1948).
(23) "The Vulcanizing Characteristics of Reinforcing Furnace Carbon." D. F. Cranor, J. W. Snyder, A. G. Cobbe, *Ibid.*, 117, 749 (1948).
(24) "Safe Acceleration for Use with Fine Particle Size Reinforcing Furnace Blacks." F. L. Holbrook, B. A. Hunter, *Ibid.*, 119, 208 (1948).
(25) "Application of Very Fine Furnace Black in Low Temperature GR-S." H. A. Braendle, C. W. Sweitzer, H. C. Steffen, *Rubber Age (N. Y.)*, 64, 708 (1949).
(26) "Colloidal Structure of Rubber in Solution." S. D. Gehman, J. E. Field, *Rubber Chem. Tech.*, 13, 275 (1940).
(27) "Control by Individual Incorporation of Vulcanizing Agents." D. F. Twiss, *Ibid.*, 13, 249 (1940).
(28) "Cure of GR-S in Thick Articles." R. E. Morris, J. W. Hollister, P. A. Mallard, *Ibid.*, 17, 984 (1944).
(29) "Temperature Coefficient of Vulcanization of Buna S." L. E. Cheyney, R. W. Duncan, *Ibid.*, 17, 412 (1944).
(30) "Mastication and Rate of Set-up—Part II." S. Buchan, *Ibid.*, 18, 441 (1945).
(31) "Symposium on Application Research Methods—Rubber Chemicals." M. G. Shepherd, *Chem. Eng. News*, 26, 1140 (1948).

Rubber Goods Output up in Japan

Production of rubber goods in Japan increased considerably in the first quarter of 1949, as compared with the first quarter of 1948, as the following table shows:

	First Quarter, 1949	First Quarter, 1948
Tires for trucks	135,934	65,326
Tubes for trucks	137,978	68,761
Tires for passenger cars and motor cycles	75,167	34,829
Tubes for passenger cars and motor cycles	69,741	38,766
Tires for other vehicles	10,234	3,973
Tubes for other vehicles	10,558	7,064
Tires for bicycles	1,198,475	767,786
Tubes for bicycles	1,363,781	781,188
Rubber footwear, *prs*	9,065,290	5,546,581

High-Temperature Mixing of Fully Reinforcing Carbon Blacks in Synthetic and Natural Rubbers—II

Isaac Drogin,[1] Hester R. Bishop,[2] and Paul Wiseman[2]

THE factual data on processing, bound rubber, gel, and reinforcement which resulted from the mixing of the five fully reinforcing carbon blacks in the three polymers over a range of maximum stock temperatures are presented in Tables 3 through 5. The data for GR-S X-478 (41° F.) are shown in Table 3; those for GR-S-10 (122° F.) are shown in Table 4; and those for natural rubber are shown in Table 5. Much of this information in relation to the maximum stock temperatures attained is also presented graphically in Figures 1-18. Figures 1-3 deal with Mooney viscosity; Figures 4-6, with Mooney scorch; Figures 7-9, with % shrinkage; Figures 10-12, with flex crack (cut growth); Figures 13-15, with modulus; and Figures 16-18, with tensile strength.

Discussion of Results

The general effects of mixing at higher than normal temperatures are evidenced by lower power requirement, lower rate of extrusion (Tables 3-5), higher Mooney viscosity (Figures 1-3), more tendency to scorch except for the furnace blacks in GR-S X-478 (Figures 4-6), less nerve (Figures 7-9), more bound rubber and gel (Tables 3-5), higher modulus (Figures 13-15), lower tensile strength (Figures 16-18), shorter elongation at break, higher rebound, and a lower resistance to abrasion (Tables 3-5) and flex cracking (Figures 10-12). The extent of the effects is not shared alike by either the carbon blacks or polymers. Much depends on the type of black, its background of manufacture, and inherent physical and chemical characteristics (Table 1).[3] Hence there is a wide spread in the effects of high-temperature mixing of the fully reinforcing carbon blacks. Similarly, there is appreciable variation in the effects of high-temperature mixing of natural rubber (Table 5) and synthetic rubber (Tables 3 and 4), and of synthetic rubber polymerized at a low temperature (Table 3) and at a high temperature (Table 4). An attempt will be made in the discussion that follows to compare, first, the effects of high-temperature mixing of the five fully reinforcing carbon blacks in each polymer and then to compare the effects of high-temperature mixing of the three polymers with each carbon black.

Effects of High-Temperature Mixing of Fully Reinforcing Carbon Blacks in GR-S X-478 (41° F.)

With increase in maximum stock temperature, the following effects are noted in the processing and reinforcement of the stocks.

PROCESSING. The power consumption decreases (Table 3). The effect is most pronounced with Philblack 0 and least pronounced with Kosmos 60-Dixie 60. The rate of extrusion of Kosmobile 77-Dixiedensed 77 increases; that of Philblack 0 and Vulcan 3 decreases. Very little change occurs in the rate of extrusion of Kosmos 60-Dixie 60 and Statex-K. The shrinkage of the mill stocks, up to maximum stock temperatures of about 410° F., increases in the case of the fully reinforcing furnace blacks, but remains practically unchanged in the case of the channel black (Table 3 and Figure 7). At a higher maximum stock temperature the shrinkage of all the blacks, with the exception of Kosmos 60-Dixie 60, decreases; whereas that of Kosmos 60-Dixie 60 continues to increase. The compound viscosity increases (Table 3 and Figure 1). The effect is most pronounced with the channel black. The time to scorch, at maximum stock temperatures up to 375° F., increases (indicating safer processing) in the case of the fully reinforcing furnace blacks, but decreases (less safe processing) in the case of channel black (Table 3 and Figure 4). At higher maximum stock temperatures the time to scorch decreases in the case of all the blacks studied.

At maximum stock temperatures in the range of approximately 270 to 328° F., the bound rubber and gel (Table 3) decrease in the case of the channel black, but increase in the case of the furnace blacks. At higher maximum stock temperatures up to approximately 380° F., there is an increase in the bound rubber and gel in the case of the channel black and a slight decrease in the case of the furnace blacks. At higher maximum stock temperatures, the bound rubber and gel increase in the case of all the blacks.

REINFORCEMENT. The modulus increases. The effect is pronounced for all the blacks studied (Table 3 and Figure 13). The tensile strength is at a maximum in the case of Kosmobile 77-Dixiedensed 77 and Statex-K at maximum stock temperatures up to 330° F. It then drops off. It is at a maximum in the case of Kosmos 60-Dixie 60 and Philblack 0 at maximum stock temperatures up to 360° F. It then drops off. It is at a maximum in the case of Vulcan 3 at maximum stock temperatures up to 375° F., and then decreases (Table 3 and Figure 16).

The hardness remains practically unchanged for all the blacks studied (Table 3). The rebound, up to maximum stock temperatures of 375° F., increases. The effect is more pronounced with the channel black. At higher maximum stock temperatures, the rebound of the channel black decreases; whereas that of Kosmos 60-Dixie 60, Philblack 0, and Vulcan 3 continues to increase. The rebound of Statex-K starts to decrease at the maximum stock temperature above 416° F. The resistance to abrasion is improved in the case of the channel black, but remains practically unchanged in the case of the fully reinforcing furnace blacks. The resistance to flex cut-growth decreases. The effect is most pronounced with Kosmos 60-Dixie 60, Philblack 0, and Vulcan 3. It is least pronounced with Statex-K (Table 3 and Figure

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[3] India RUBBER WORLD, Sept., 1949, p. 696.

TABLE 3. HIGH-TEMPERATURE MIXING OF GR-S X-478 (41° F.) WITH FULLY REINFORCING CARBON BLACKS

Carbon Black			Kosmobile 77-Dixiedensed 77					Statex-K					Kosmos 60-Dixie 60					Philblack O					Vulcan 3				
Type	Curing Time (Min.)	Temp. (°F.)	EPC					VFF					RF					HAF					HAF				
PROCESSING DATA																											
Banbury Max. Stock Temp. (°F.)[1]			272	328	386	410	438	265	329	376	416	433	272	329	372	408	430	270	330	376	410	437	268	340	375	410	434
Total Power (Watt-Hours)			1710	1590	1600	1490	1490	1730	1560	1295	1310	1450	1665	1650	1500	1515	1520	1800	1700	1410	1310	1275	1795	1680	1390	1380	1400
Extrusion Rate at 200° F. (Grams per Minute)			17.8	18.7	18.1	19.6	22.1	23.2	24.1	22.9	21.3	23.1	26.5	26.8	26.9	25.1	25.4	28.4	27.9	26.2	24.7	24.3	26.7	26.7	25.6	23.9	24.4
Per Cent. Mill Shrinkage			35	35	34	33	25	27	28	29	33	27	20	18	23	26	27	20	24	25	27	25	22	26	27	31	28
Compound Mooney Viscosity ML, 4' at 212° F.			57	59	62	64	78	55	55	56	60	65	61	60	63	66	73	59	61	60	65	67	57	59	58	65	66
Mooney Scorch MS, at 250° F. (Minutes)			96	90	91	88	79	54	59	70	66	60	56	70	73	61	65	59	72	72	69	67	63	65	73	70	67
Per Cent. Bound Rubber[2]			38.4	31.7	34.8	38.6	52.8	25.2	31.3	30.8	35.7	41.6	30.7	31.2	30.6	34.7	41.3	26.0	29.6	27.8	34.5	40.0	22.2	26.9	27.4	33.5	38.7
Per Cent. Gel[3]			56.8	52.8	54.7	57.1	65.4	49.6	53.2	53.0	55.9	59.4	52.5	52.7	52.4	54.8	60.6	47.0	51.7	50.7	54.7	58.1	47.4	50.2	50.5	54.2	57.2
REINFORCEMENT DATA																											
Modulus at 300% Elongation (Lbs./Sq. In.)	20	299	300	320	400	470	1280	1100	1070	1240	1560	2010	1100	890	1120	1220	1650	890	1000	820	1220	1370	770	940	720	990	1160
	30	299	760	1000	1330	1480	2100	1530	1600	1870	2100	2500	1660	1780	1980	2220	2500	1620	1670	1760	2040	2200	1400	1650	1580	1900	2060
	45	299	1080	1380	1720	1950	2520	1650	1850	2030	2300	2680	2000	2230	2420	2620	2860	1900	2060	2220	2480	2720	1750	2080	2020	2390	2520
	60	299	1170	1420	1860	2030	2650	1690	1900	2100	2340	2730	2080	2370	2530	2780	3020	2030	2250	2330	2600	2800	1910	2200	2220	2500	2680
Tensile Strength (Lbs./Sq. In.)	20	299	2070	2120	1460	1700	2150	3610	3570	3450	3600	3300	3180	2820	2970	2750	3020	2950	3070	2620	2780	2620	2570	2640	2170	2300	2470
	30	299	3820	4060	3800	3420	2560	3690	3780	3900	3800	3580	3730	3730	3820	3570	3700	3550	3670	3750	3710	3400	3470	3710	3300	3600	3620
	45	299	3820	4060	3800	3520	2720	3940	3860	3900	3700	3500	3730	3930	3970	3980	3700	3930	3770	4010	3710	3530	3940	3920	3630	3840	3870
	60	299	3780	3780	3700	3480	2650	3570	3930	3720	3580	3400	3730	3880	3920	3840	3700	3930	3770	3980	3630	3530	3940	3970	3960	3980	3800
Per Cent Elongation at Break	20	299	980	900	690	660	420	700	725	635	550	430	640	660	615	545	470	675	650	700	550	480	680	620	640	540	515
	30	299	740	690	580	510	340	565	570	530	470	400	540	520	490	470	400	530	520	525	465	415	565	550	510	485	460
	45	299	620	590	510	440	320	560	525	490	420	370	475	455	440	410	365	510	470	475	410	370	535	490	465	430	410
	60	299	605	545	470	420	300	510	515	460	400	360	460	430	415	380	350	485	435	450	390	360	510	460	465	425	390
Hardness Shore Durometer (Inches x 10^3)	20	299	50	50	50	51	60	60	60	60	60	61	61	58	57	57	61	59	58	56	59	60	58	56	56	56	57
	30	299	58	58	60	60	65	63	64	63	61	65	63	62	63	64	65	61	64	62	64	64	60	60	60	61	61
	45	299	62	62	63	62	67	64	65	64	64	66	65	65	66	65	67	64	65	63	65	65	64	61	65	64	64
	60	299	64	64	64	64	68	65	66	65	65	67	67	67	67	66	68	65	65	66	66	66	65	64	65	65	65
Per Cent. Rebound	20	299	42	43	45	44	43	41	42	42	44	44	42	42	44	43	46	42	43	43	44	43	43	43	44	46	46
	30	299	43	44	47	45	43	41	42	42	46	44	42	43	44	43	46	42	43	43	46	45	44	45	45	47	47
	45	299	43	45	47	45	43	41	42	43	46	44	43	44	44	44	46	42	43	43	46	46	44	45	45	47	47
	60	299	43	45	47	45	43	41	42	43	46	44	43	44	44	43	47	42	43	43	46	46	43	45	45	47	47
Flex, De Mattia Cut Growth to Failure (Flexes)[4]	60	299	3085	2395	2180	2555	785	3530	2795	2565	2450	2980	3250	1800	1735	2405	765	3900	3740	3410	2220	1227	4000	4445	3669	2390	1745
Aged Abrasion Resistance[5] (Grams Loss/Hour)	60	299	25.0	22.5	19.9	19.3	19.2	17.8	19.0	19.2	18.0	17.1	12.6	14.0	13.9	13.9	13.9	14.1	14.4	15.2	15.1	14.1	14.0	15.6	17.2	14.9	14.6
Firestone Flexometer[6] 60' Cycle (°F.)	60	299	232	228	220	209	232	221	216	210	211	217	240	234	233	221	236	224	225	219	219	217	217	218	208	215	219
Goodrich Flexometer[7] 30' Cycle (°F.)	60	299	224	218	214	208	220	229	224	215	223	223	237	230	231	226	235	235	229	227	235	235	239	235	240	234	235
Per Cent. Compression	60	299	1.2	2.4	1.7	1.2	2.3	2.4	1.2	1.2	1.8	1.2	1.8	1.2	1.7	1.2	1.7	1.8	1.8	1.7	1.8	1.2	3.0	1.6	4.1	1.8	2.3
Per Cent. Set	60	299	2.8	1.6	0.8	0.8	0.8	1.6	0.8	1.2	1.6	1.6	2.4	1.6	2.0	1.2	1.6	2.4	2.8	1.6	1.6	2.0	2.4	2.0	2.8	2.0	2.0

1 Banbury maximum stock temperature taken at 11' before addition of softeners.
2 Based on rubber hydrocarbon.
3 Based on fully compounded stock.
4 Initial slit, 0.125"; extension, 1"; bend, 1/2".
5 Modified Goodyear angle abrader. Angle, 11°; load, 32#; RPM, 50. Wheels aged in Geer oven 24 hours at 100° C.
6 Load, 250#; throw, 0 3"; oscillating plate, 800 RPM.
7 Oven, 100° F.; load, 175#; stroke, 0.175".

10). The heat build-up decreases. The effect is most pronounced in the case of Kosmobile 77-Dixiedensed 77 and Kosmos 60-Dixie 60, up to maximum stock temperatures of 410° F. At higher maximum stock temperatures their heat build-up increases. The effect is less pronounced in the case of Philblack 0 and Vulcan 3 (Table 3).

Effects of High-Temperature Mixing of Fully Reinforcing Carbon Blacks in GR-S-10 (122° F.)

With increase in maximum stock temperature, the following effects are noted in the processing and reinforcement of the stocks.

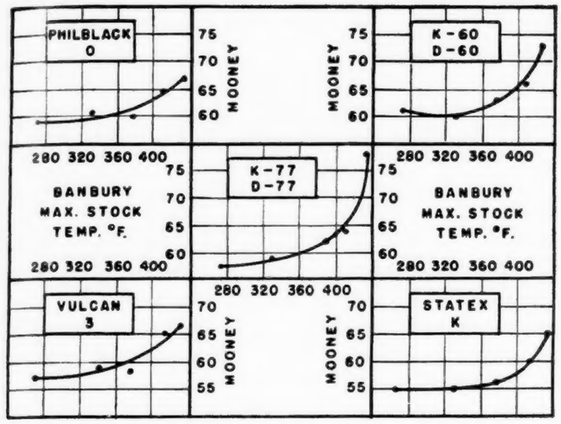

FIG. I. MOONEY VISCOSITY OF GR-S X-478 (41°F.) WHEN MIXED AT VARIOUS TEMPERATURES

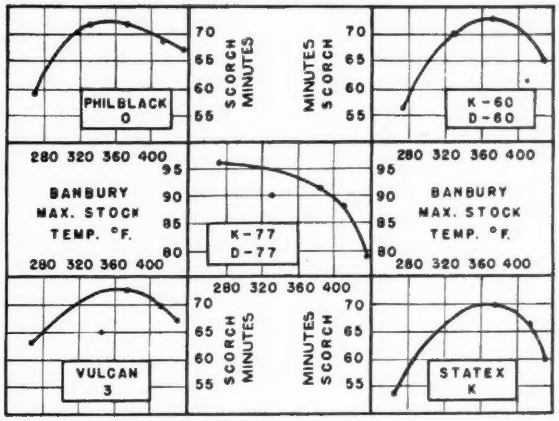

FIG. 4. MOONEY SCORCH OF GR-S X-478 (41°F.) WHEN MIXED AT VARIOUS TEMPERATURES

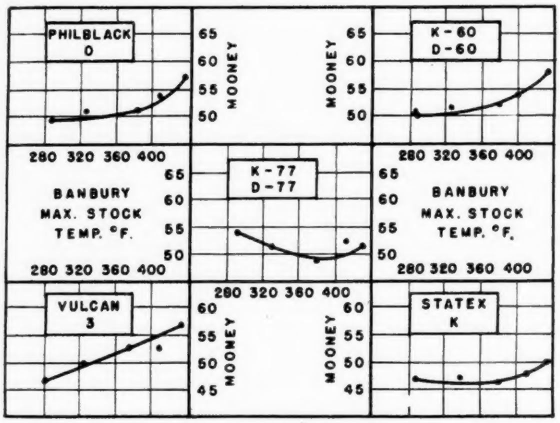

FIG. 2. MOONEY VISCOSITY OF GR-S-10 (122°F.) WHEN MIXED AT VARIOUS TEMPERATURES

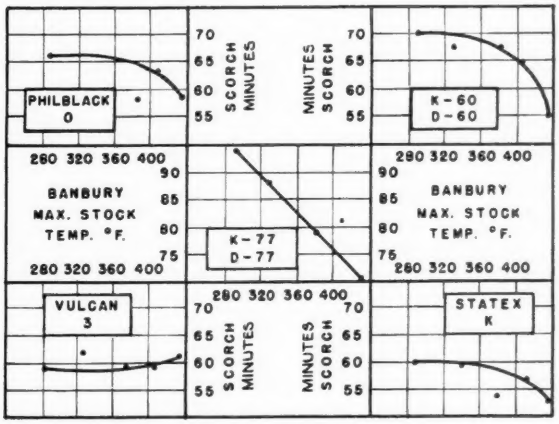

FIG. 5. MOONEY SCORCH OF GR-S-10 (122°F.) WHEN MIXED AT VARIOUS TEMPERATURES

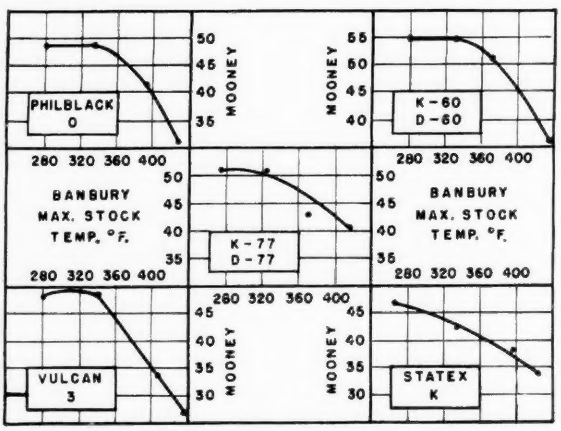

FIG. 3. MOONEY VISCOSITY OF NATURAL RUBBER WHEN MIXED AT VARIOUS TEMPERATURES

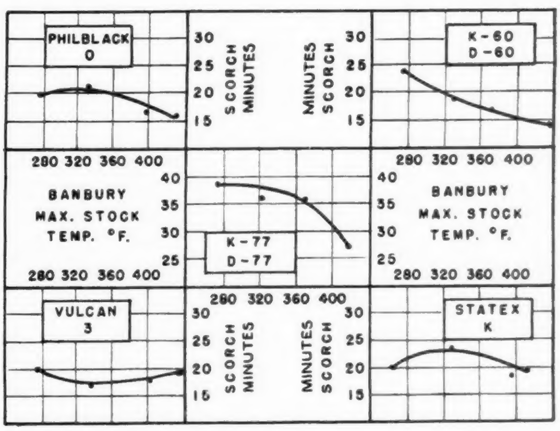

FIG. 6. MOONEY SCORCH OF NATURAL RUBBER WHEN MIXED AT VARIOUS TEMPERATURES

TABLE 4. HIGH-TEMPERATURE MIXING OF GR-S-10 (122° F.) WITH FULLY REINFORCING CARBON BLACKS

Carbon Black	Curing Time (Min.)	Temp. (°F.)	Kosmobile 77–Dixiedensed 77					Statex-K					Kosmos 60–Dixie 60				
Type			EPC					VFF					RF				
PROCESSING DATA																	
Banbury Max. Stock Temp. (°F.)[1]			290	328	381	410	432	285	339	379	412	440	288	328	380	403	435
Total Power (Watt-Hours)			1990	1660	1560	1430	1360	1810	1580	1520	1390	1300	1980	1750	1690	1670	1590
Extrusion Rate at 200° F. (Grams per Minute)			13.4	19.0	25.4	25.8	25.6	16.9	18.9	21.1	21.0	21.1	21.7	22.4	23.3	23.2	22.6
Per Cent. Mill Shrinkage			36	31	21	18	19	31	28	30	23	19	23	21	19	19	15
Compound Mooney Viscosity ML, 4' at 212° F.			54	51	49	53	52	47	47	46	48	50	50	52	52	54	58
Mooney Scorch MS, at 250° F. (Minutes)			94	88	79	81	69	60	59	54	57	53	70	67	68	65	55
Per Cent. Bound Rubber[2]			37.4	37.0	40.9	44.3	44.8	32.0	32.8	35.5	38.3	42.3	33.1	36.3	39.2	41.8	46.8
Per Cent. Gel[3]			57.5	57.3	59.7	61.7	62.1	55.0	55.6	57.2	58.8	61.3	55.0	56.9	58.7	60.3	63.4
REINFORCEMENT DATA																	
Modulus at 300% Elongation (Lbs./Sq. In.)	20	299	460	600	700	840	600	1120	1330	1380	1330	1700	960	1130	1070	1340	1270
	30	299	1020	1170	1480	1690	1560	1690	1800	1920	2040	2300	1680	2000	1900	2100	2150
	45	299	1430	1530	1880	2130	2050	1860	2000	2130	2260	2450	2070	2380	2380	2560	2570
	60	299	1530	1620	1970	2200	2170	1900	2000	2160	2300	2540	2200	2450	2460	2650	2680
Tensile Strength (Lbs./Sq. In.)	20	299	1380	1600	1580	1520	1110	2420	2730	2510	2280	2270	1880	2050	1740	2000	1780
	30	299	2970	2610	2570	2600	2430	3020	3040	2580	2570	2530	2740	2900	2730	2780	2300
	45	299	3000	2680	2570	2550	2430	3020	3040	2660	2680	2530	3100	3080	3000	2950	2570
	60	299	3000	2680	2570	2500	2340	3020	3040	2860	2680	2530	2880	3130	2880	2900	2680
Per Cent. Elongation at Break	20	299	660	570	490	430	440	530	500	450	430	365	485	460	435	410	375
	30	299	610	510	430	410	400	470	435	370	350	320	430	410	390	370	315
	45	299	500	440	370	340	335	430	410	350	335	310	410	365	360	335	300
	60	299	485	420	350	325	315	420	410	365	330	300	365	360	335	320	300
Hardness Shore Durometer (Inches x 10^3)	20	299	52	53	55	56	55	56	60	60	59	60	55	56	56	57	56
	30	299	61	60	60	60	61	61	61	63	62	62	61	61	61	62	62
	45	299	65	61	64	65	64	62	62	64	64	64	64	64	64	64	65
	60	299	65	63	65	66	65	62	64	65	65	65	65	65	65	65	66
Per Cent. Rebound	20	299	35	36	38	37	37	38	38	39	38	38	38	39	40	38	37
	30	299	37	37	39	38	38	38	39	40	39	39	38	40	41	38	38
	45	299	37	38	39	39	39	39	40	42	39	40	39	41	42	39	40
	60	299	37	38	38	39	39	40	40	40	39	40	38	40	41	40	40
Flex, De Mattia Cut Growth to Failure (Flexes)[4]	60	299	3700	3700	4825	2885	4200	4410	2643	4275	5025	2310	2700	1780	2185	2170	350
Aged Abrasion Resistance (Grams Loss/Hour)[5]	60	299	19.8	19.3	17.2	17.7	16.5	14.6	15.2	15.5	15.1	15.4	11.0	11.5	12.1	11.8	11.8
Firestone Flexometer 60' Cycle (°F.)[6]	60	299	221	213	216	214	211	217	216	215	220	218	225	226	219	222	222
Goodrich Flexometer 30' Cycle (°F.)[7]	60	299	236	234	228	231	230	246	236	231	234	241	254	255	254	252	255
Per Cent. Compression	60	299	5.5	4.2	2.9	2.3	1.7	3.1	2.9	2.4	2.3	2.8	3.6	4.2	3.6	1.8	1.8
Per Cent. Set	60	299	3.6	3.2	2.0	1.2	1.6	3.6	2.0	2.0	1.6	2.8	3.6	4.0	4.4	2.8	1.6

Carbon Black	Curing Time (Min.)	Temp. (°F.)	Philblack O					Vulcan 3				
Type			HAF					HAF				
PROCESSING DATA												
Banbury Max. Stock Temp. (°F.)[1]			284	325	383	410	436	280	322	374	408	434
Total Power (Watt-Hours)			1990	1740	1570	1620	1510	1940	1740	1710	1550	1520
Extrusion Rate at 200° F. (Grams per Minute)			20.8	21.7	22.2	21.8	22.3	20.9	20.7	22.1	20.7	22.8
Per Cent. Mill Shrinkage			27	23	23	20	17	24	25	25	22	15
Compound Mooney Viscosity ML, 4' at 212° F.			49	51	51	54	57	47	50	53	52	57
Mooney Scorch MS, at 250° F. (Minutes)			66	57	58	63	58	59	62	59	59	61
Per Cent. Bound Rubber[2]			33.4	35.9	37.4	42.8	47.2	32.6	34.7	37.9	40.4	46.6
Per Cent. Gel[3]			55.2	56.7	57.7	61.0	63.7	54.7	56.0	58.0	59.5	63.2
REINFORCEMENT DATA												
Modulus at 300% Elongation (Lbs./Sq. In.)	20	299	800	1020	1000	1350	1550	800	740	910	1110	1100
	30	299	1530	1800	1850	2120	2260	1440	1670	1720	1870	2020
	45	299	1960	2240	2350	2470	2570	1830	2140	2150	2310	2450
	60	299	2050	2290	2460	2580	2680	2000	2290	2300	2430	2650
Tensile Strength (Lbs./Sq. In.)	20	299	1640	1940	1770	2080	2000	1680	1480	1570	1770	1460
	30	299	2680	2800	2600	2600	2400	2500	2530	2520	2020	2020
	45	299	2740	3130	2920	2680	2570	2950	2880	2800	2760	2500
	60	299	2720	2940	2920	2800	2680	2900	2900	2800	2700	2650
Per Cent. Elongation at Break	20	299	500	465	440	410	360	500	485	440	430	360
	30	299	450	420	380	350	315	450	415	390	320	320
	45	299	390	385	350	320	300	425	375	360	340	310
	60	299	365	360	335	320	300	400	375	350	320	300
Hardness Shore Durometer (Inches x 10^3)	20	299	55	55	56	60	60	55	55	55	56	56
	30	299	60	61	61	63	64	59	59	60	61	61
	45	299	64	64	64	65	66	62	63	63	63	64
	60	299	64	64	65	66	66	62	64	64	64	65
Per Cent. Rebound	20	299	38	39	40	40	38	41	40	42	40	40
	30	299	40	41	41	41	39	41	42	43	41	41
	45	299	41	41	42	42	40	42	43	42	42	42
	60	299	40	41	42	42	41	41	42	42	42	42
Flex, De Mattia Cut Growth to Failure (Flexes)[4]	60	299	5807	5345	4080	1830	255	5484	5310	2550	1950	370
Aged Abrasion Resistance (Grams Loss/Hour)[5]	60	299	12.1	12.7	13.0	12.8	12.8	11.5	12.4	12.7	12.3	12.8
Firestone Flexometer 60' Cycle (°F.)[6]	60	299	220	227	222	224	220	219	226	230	227	224
Goodrich Flexometer 30' Cycle (°F.)[7]	60	299	258	255	247	246	254	259	256	251	252	253
Per Cent. Compression	60	299	3.6	3.6	2.4	2.3	2.4	3.8	4.2	4.1	3.5	3.5
Per Cent. Set	60	299	4.4	4.0	2.8	2.0	3.2	5.6	4.0	4.0	3.6	4.0

1 Banbury maximum stock temperature taken at 11' before addition of softeners.
2 Based on rubber hydrocarbon.
3 Based on fully compounded stock.
4 Initial slit, 0.125"; extension, 1"; bend, 1/2".
5 Modified Goodyear angle abrader. Angle, 11°; load, 32#; RPM, 50. Wheels aged in Geer oven 24 hours at 100° C.
6 Load, 250#; throw, 0.3"; oscillating plate, 800 RPM.
7 Oven, 100° F.; load, 175#; stroke, 0.175".

PROCESSING. The power consumption decreases. The effect is most pronounced with the channel black (Table 4). The rate of extrusion increases. The effect is most pronounced with Kosmobile 77-Dixiedensed 77 and least pronounced with Kosmos 60-Dixie 60, Philblack 0, and Vulcan 3. The shrinkage of the mill stocks decreases. The effect is more pronounced with Kosmobile 77-Dixiedensed 77 and least pronounced with Kosmos 60-Dixie 60, Philblack 0, and Vulcan 3 (Table 4 and Figure 8). The compound viscosity remains practically unchanged in the case of Statex-K up to a maximum stock temperature of 380° F., but increases in the case of Kosmos 60-Dixie 60, Philblack 0, and Vulcan 3. It decreases in the case of Kosmobile 77-Dixiedensed 77, up to a maximum

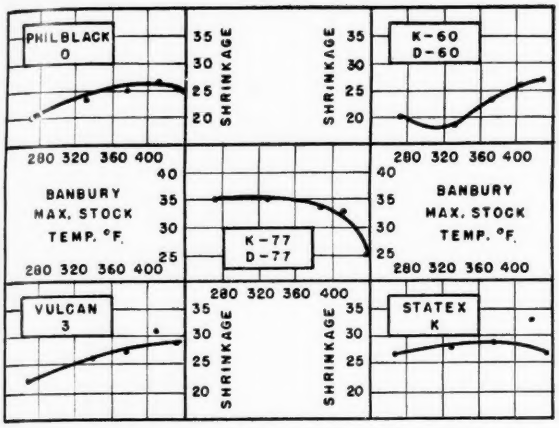

FIG. 7. PERCENT. SHRINKAGE OF GR-S X-478 (41°F.) WHEN MIXED AT VARIOUS TEMPERATURES

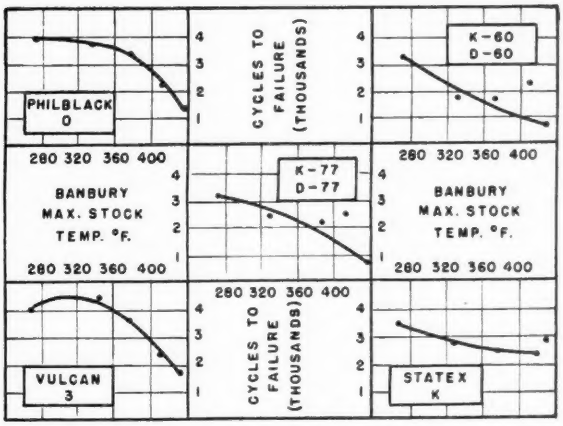

FIG. 10. FLEX (CUT GROWTH) OF GR-S X-478 (41°F.) WHEN MIXED AT VARIOUS TEMPERATURES

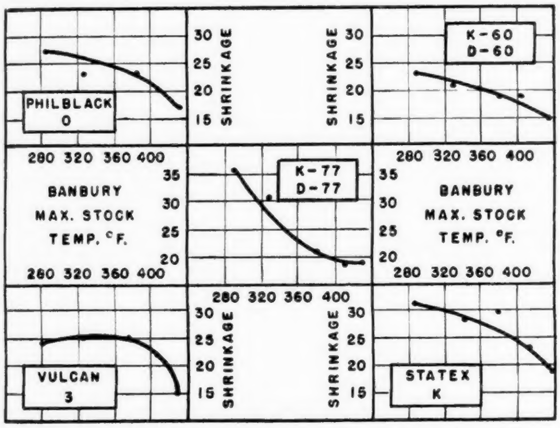

FIG. 8. PERCENT. SHRINKAGE OF GR-S-10 (122°F.) WHEN MIXED AT VARIOUS TEMPERATURES

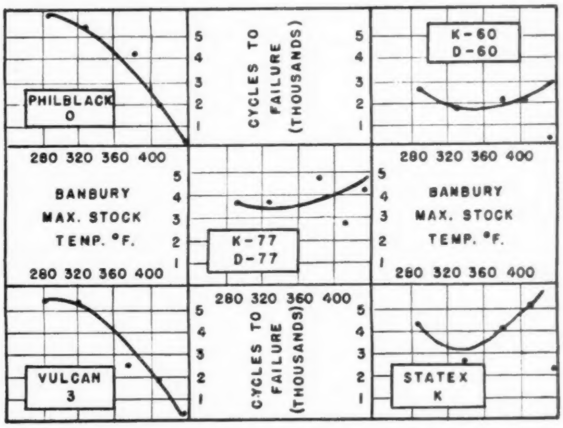

FIG. 11. FLEX (CUT GROWTH) OF GR-S-10 (122°F.) WHEN MIXED AT VARIOUS TEMPERATURES

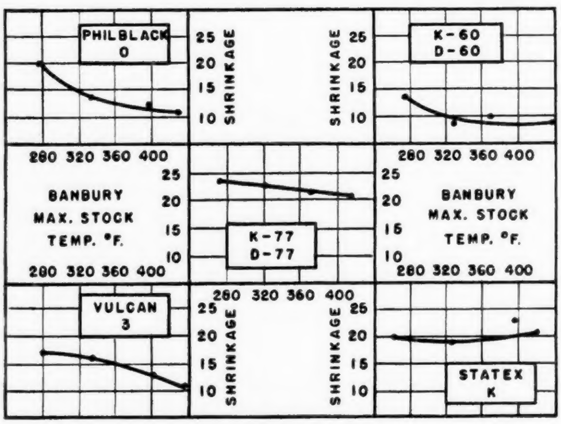

FIG. 9. PERCENT. SHRINKAGE OF NATURAL RUBBER WHEN MIXED AT VARIOUS TEMPERATURES

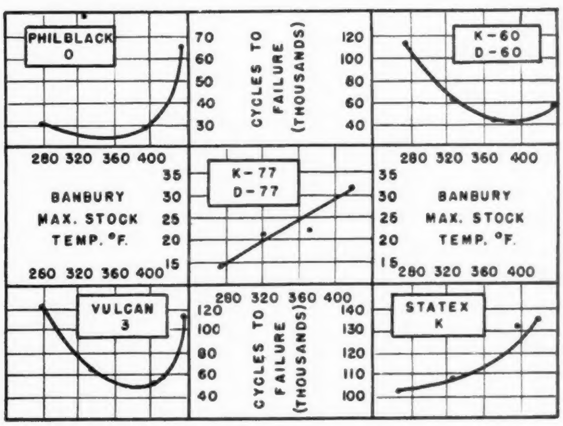

FIG. 12. FLEX (CUT GROWTH) OF NATURAL RUBBER WHEN MIXED AT VARIOUS TEMPERATURES

TABLE 5. HIGH-TEMPERATURE MIXING OF NATURAL RUBBER WITH FULLY REINFORCING CARBON BLACKS

Carbon Black	Curing Time (Min.)	Temp. (°F.)	Kosmobile 77-Dixiedensed 77				Statex-K				Kosmos 60-Dixie 60				Philblack O				Vulcan 3			
Type			EPC				VFF				RF				HAF				HAF			
PROCESSING DATA																						
Banbury Max. Stock Temp. (°F.)[1]			273	322	371	416	264	328	395	422	275	326	372	442	278	330	397	430	279	335	406	437
Total Power (Watt-Hours)			1400	1330	1220	1110	1550	1425	1180	1090	1690	1620	1270	1070	1670	1555	1300	1160	1670	1520	1210	1130
Extrusion Rate at 200° F. (Grams per Minute)			26.9	23.3	24.9	24.8	29.3	27.2	26.5	25.5	27.3	25.6	26.4	25.7	29.0	28.9	28.9	27.8	30.1	29.2	27.2	24.0
Per Cent. Mill Shrinkage			24	23	22	21	20	19	23	21	14	9	10	9	20	14	13	11	17	16	13	11
Compound Mooney Viscosity ML, 4' at 212° F.			51	51	43	41	47	43	39	34	55	55	51	36	49	49	41	31	49	50	34	27
Mooney Scorch MS, at 250° F (Minutes)			39	36	36	28	20	24	19	20	24	19	17	14	20	21	17	16	20	17	18	19
Per Cent. Bound Rubber[2]			31.8	31.6	34.8	37.5	33.0	33.0	37.9	27.5	30.8	30.8	31.0	28.7	27.0	28.7	27.5	25.9	25.7	29.0	26.3	23.6
Per Cent. Gel[3]			54.2	54.1	56.1	57.7	54.5	54.5	57.5	51.2	52.8	52.8	53.0	51.7	50.6	51.6	50.8	49.9	49.8	51.8	50.2	48.5
REINFORCEMENT DATA																						
Modulus at 300% Elongation (Lbs./Sq. In.)	20	280	800	1060	1210	1500	1220	1360	1430	1530	1500	1720	1820	1920	1310	1500	1590	1400	1230	1550	1470	1100
	30	280	1140	1300	1470	1720	1450	1600	1740	1680	1800	2000	2030	2140	1700	1860	1870	1680	1610	1880	1760	1310
	45	280	1320	1480	1610	1800	1570	1730	1750	1750	1960	2150	2160	2200	1920	2040	1980	1750	1840	2060	1940	1550
	60	280	1420	1500	1610	1800	1570	1730	1690	1750	2020	2150	2180	2140	1970	2090	1980	1750	1840	2080	1940	1580
Tensile Strength (Lbs./Sq. In.)	20	280	3760	4050	3800	3800	4100	4060	4040	3700	3700	3840	3830	3380	3230	3450	3400	2400	3200	3320	2930	2020
	30	280	4470	4220	4270	4330	4500	4200	4200	3750	4000	4100	3900	3680	3970	3930	3900	2880	3900	4000	3300	2200
	45	280	4650	4540	4270	4260	4430	4260	4120	3900	4040	4100	4030	3620	4080	4110	3900	3060	4120	4200	3640	2850
	60	280	4650	4370	4270	4200	4280	4340	4030	3750	4100	4100	3950	3540	4040	4080	3820	3060	3980	4140	3480	2900
Per Cent. Elongation at Break	20	280	700	640	600	440	660	640	600	550	570	550	540	475	575	550	515	440	565	520	490	450
	30	280	670	610	580	450	650	600	560	525	565	520	515	470	565	550	525	450	565	535	475	440
	45	280	650	610	560	435	635	575	540	525	530	500	505	460	560	525	500	460	550	525	490	480
	60	280	640	585	560	440	615	580	550	515	525	500	480	445	540	515	490	460	535	515	470	470
Hardness Shore Durometer (Inches x 10^3)	20	280	54	57	55	55	60	62	60	60	62	63	64	62	58	60	60	55	59	62	58	54
	30	280	60	61	59	60	63	64	63	63	65	65	67	64	64	65	63	60	65	65	61	56
	45	280	62	64	62	61	65	66	65	65	67	67	68	65	65	66	64	62	66	66	63	60
	60	280	64	65	64	62	67	67	66	64	68	68	68	66	66	67	65	62	67	67	65	62
Per Cent. Rebound	20	280	42	46	47	50	46	45	51	47	43	47	47	43	42	42	45	43	46	49	47	42
	30	280	43	47	49	52	49	48	51	47	45	49	47	44	44	43	46	44	47	50	50	42
	45	280	43	47	49	52	46	47	51	47	45	49	47	44	44	44	48	46	47	50	50	43
	60	280	43	47	49	52	47	47	50	47	45	49	47	44	44	44	48	44	49	50	50	43
Flex, De Mattia Cut Growth to Failure (Flexes)[4]	60	280	14650	21320	21640	31185	103720	108215	130920	135755	113842	61530	44986	57850	31035	81699	29065	65875	121225	65342	51805	113665
Aged Abrasion Resistance (Grams Loss/Hour)[5]	60	280	29.6	28.4	26.9	25.9	28.2	27.0	26.4	25.5	18.5	17.9	16.3	15.3	21.1	20.6	19.9	19.0	21.7	20.7	19.4	19.7
Firestone Flexometer 60' Cycle (°F.)[6]	60	280	200	198	190	192	184	182	182	177	217	214	219	224	176	148	180	195	186	166	188	211
Goodrich Flexometer 30' Cycle (°F.)[7]	60	280	185	177	181	182	196	191	189	193	203	199	195	212	199	197	203	245	194	190	205	259
Per Cent. Compression	60	280	4.2	4.2	3.6	3.1	6.7	4.9	4.3	4.3	5.5	5.3	4.1	5.0	3.7	4.2	5.0	9.7	5.4	4.2	5.5	14.1
Per Cent. Set	60	280	3.2	2.4	2.8	2.0	4.8	3.2	3.2	2.8	4.8	2.8	2.0	4.8	3.2	2.4	4.0	8.8	3.2	1.6	4.0	10.2

1 Banbury maximum stock temperature taken at 11' before addition of softeners.
2 Based on rubber hydrocarbon.
3 Based on fully compounded stock.
4 Initial slit, 0.125"; extension, 1"; bend, 1/2".
5 Modified Goodyear angle abrader. Angle, 11°; load, 32#; RPM, 50. Wheels aged in Geer oven 24 hours at 100° C.
6 Load, 250#; throw, 0.3"; oscillating plate, 800 RPM.
7 Oven, 100° F.; load, 175#; stroke 0.175".

stock temperature of 380° F., but increases at higher maximum stock temperatures (Table 4 and Figure 2). The time to scorch decreases. The effect is most pronounced with Kosmobile 77-Dixiedensed 77. With Vulcan 3 the time to scorch is practically constant over the temperature range investigated (Table 4 and Figure 5).

The bound rubber and gel increase. The effect is relatively less pronounced with Kosmobile 77-Dixiedensed 77 (Table 4).

REINFORCEMENT. The modulus increases. The effect is pronounced for all the blacks studied (Table 4 and Figure 14). The tensile strength decreases. The effect is most pronounced with Kosmobile 77-Dixiedensed 77, and least pronounced with Kosmos 60-Dixie 60, Philblack 0, and Vulcan 3 (Table 4 and Figure 17). The elongation at break becomes shorter. The effect is most pronounced

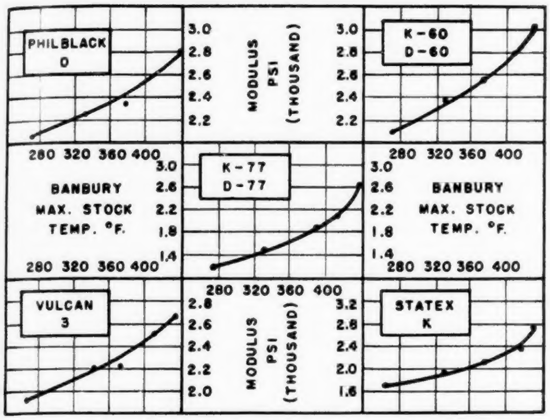

FIG. 13. MODULUS (60 MIN - 300%) OF GR-S X-478 (41°F.) WHEN MIXED AT VARIOUS TEMPERATURES

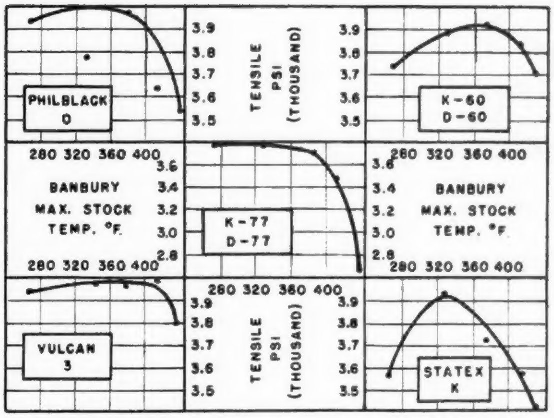

FIG. 16. TENSILE STRENGTH (60MIN.) OF GR-S X-478(41°F.) WHEN MIXED AT VARIOUS TEMPERATURES

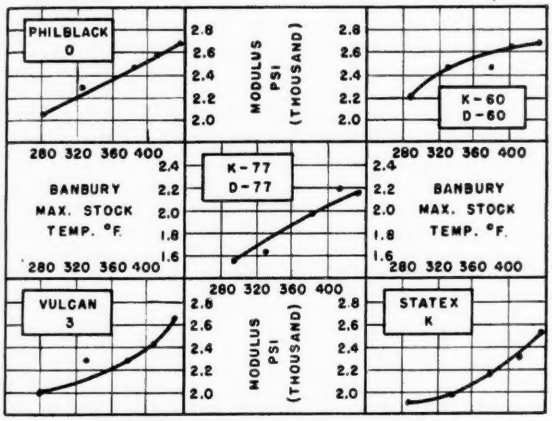

FIG. 14. MODULUS (60 MIN.-300%) OF GR-S-10 (122°F.) WHEN MIXED AT VARIOUS TEMPERATURES

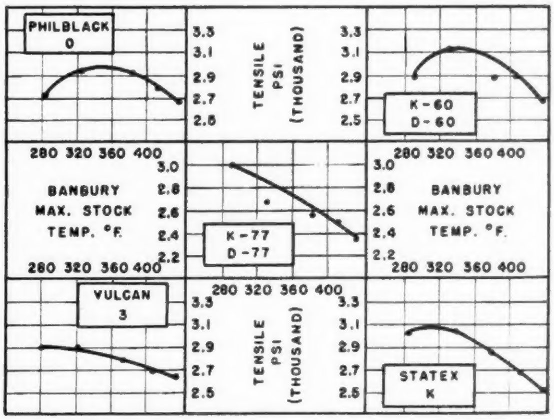

FIG. 17. TENSILE STRENGTH (60MIN.) OF GR-S-10 (122 °F) WHEN MIXED AT VARIOUS TEMPERATURES

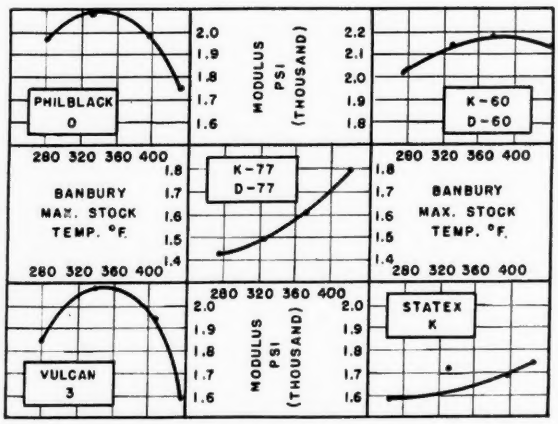

FIG. 15. MODULUS (60 MIN.-300%) OF NATURAL RUBBER WHEN MIXED AT VARIOUS TEMPERATURES

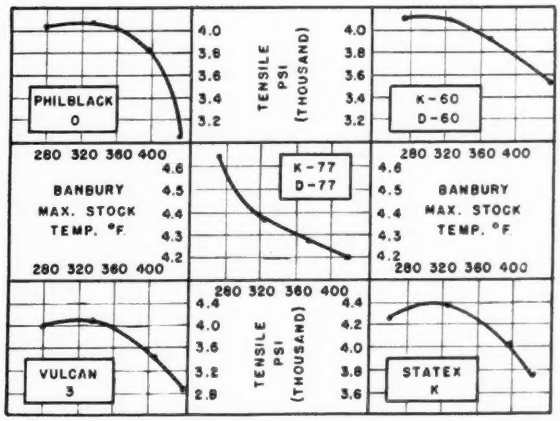

FIG. 18. TENSILE STRENGTH (60MIN.) OF NATURAL RUBBER WHEN MIXED AT VARIOUS TEMPERATURES

with Kosmobile 77-Dixiedensed 77 (Table 4). There is very little change in hardness for the carbon blacks studied. The rebound increases but very slightly for all the carbon blacks. The resistance to abrasion improves slightly for the channel black, but remains practically unchanged for the fully reinforcing furnace blacks. The heat build-up decreases but slightly for the carbon blacks studied. The resistance to flex cut-growth increases for Kosmobile 77-Dixiedensed 77 and Statex K. The effect is more pronounced with the latter. The resistance to flex cut-growth decreases for Philblack 0 and Vulcan 3. It decreases for Kosmos 60-Dixie 60 when the maximum stock temperatures are between 288 and 328° F., but increases at higher maximum stock temperature, and stays level at maximum stock temperatures in the range of 380 to 403° F. It starts to decrease again at maximum stock temperatures above 403° F. (Table 4, Figure 11).

Effects of High-Temperature Mixing of Fully Reinforcing Carbon Blacks in Natural Rubber

With increase in maximum stock temperature, the following effects are noted in the processing and reinforcement of the stocks.

PROCESSING. The power consumption decreases. The effect is most pronounced with the fully reinforcing furnace blacks and least pronounced with the channel black (Table 5). The rate of extrusion decreases. The effect is about the same for all the carbon blacks studied. The shrinkage of the mill stocks decreases. The effect is most pronounced with Philblack 0 and least pronounced with Statex-K (Table 5 and Figure 9). The compound viscosity decreases. The effect is about the same for the five carbon blacks studied (Table 5 and Figure 3). The time to scorch decreases. The effect is most pronounced with Kosmos 60-Dixie 60 and Kosmobile 77-Dixiedensed 77 and least pronounced with Statex-K and Vulcan 3 (Table 5 and Figure 6).

The bound rubber and gel (Table 5) increase in the case of the channel black and first increase and then decrease in the case of the furnace blacks. The bound rubber and gel for Statex-K reach a maximum at a maximum stock temperature of 395° F. and then decrease sharply. The maximum bound rubber and gel for Philblack 0 and Vulcan 3 are attained at a maximum stock temperature of approximately 335° F.: whereas for Kosmos 60-Dixie 60 they are practically constant up to a maximum stock temperature of 372° F. and decline from there on.

REINFORCEMENT. The modulus increases. The effect is most pronounced with Kosmobile 77-Dixiedensed 77 and least pronounced with Kosmos 60-Dixie 60. The modulus in the case of Philblack 0 and Vulcan 3 reaches a maximum at a stock temperature of about 335° F. and then starts to decrease at high stock temperatures (Table 5 and Figure 15). The tensile strength decreases. The effect is most pronounced with the channel black at maximum stock temperatures up to 375° F. At higher stock temperatures the degradation of tensile strength is more pronounced with the fully reinforcing furnace blacks, particularly Philblack 0 and Vulcan 3 (Table 5 and Figure 18). The elongation at break becomes shorter. The effect is somewhat more pronounced with Kosmobile 77-Dixiedensed 77 (Table 5). The hardness of all the carbon blacks studied changes but very little at maximum stock temperatures up to 375° F. At higher maximum stock temperatures the hardness decreases at about the same rate for all the carbon blacks. The rebound increases. The effect is somewhat more pronounced with Kosmobile 77-Dixiedensed 77. Above 375° F. the rebound for the furnace blacks decreases. The resistance to abrasion increases slightly for all the carbon blacks. The resistance to flex cut-growth increases for channel black and Statex-K, decreases up to a mixing temperature of 400° F. for Philblack 0, Kosmos 60-Dixie 60, and Vulcan 3, and then increases. (Table 5 and Figure 12). The heat build-up decreases slightly for Kosmobile 77-Dixiedensed 77 and Statex-K. It increases slightly for Kosmos 60-Dixie 60, Philblack 0, Vulcan 3 (Table 5).

Effects of High Temperature Mixing of GR-S X-478 (41° F.), GR-S-10 (122° F.), and Natural Rubber with the Easy Processing (EPC) Channel Black, Kosmobile 77-Dixiedensed 77

With increase in maximum stock temperature, the following effects are noted in the processing and reinforcement of each polymer (Tables 3-5).

PROCESSING. The power consumption decreases. The effect is more pronounced with GR-S-10 (122° F.). It is comparable for GR-S X-478 (41° F.) and natural rubber. The extrusion rate increases considerably for GR-S-10 (122° F.) up to maximum stock temperatures of 381° F., but remains unchanged at higher maximum stock temperatures. It increases but very slightly for GR-S X-478 (41° F.) up to a maximum stock temperature of 386° F., but continues to increase at higher maximum stock temperatures. The shrinkage of the mill stocks, in general, decreases. The effect is most pronounced with GR-S-10 (122° F.) (Figures 7-9). The compound viscosity increases in the case of GR-S X-478 (41° F.), but decreases in the case of GR-S-10 (122° F.) and natural rubber (Figures 1, 2, and 3). The time to scorch decreases. The effect is most pronounced with GR-S-10 (122° F.) (Figures 4-6).

The bound rubber and gel increase. The highest amounts are evidenced in GR-S-10 (122° F.) over the range of mixing temperatures 290 to 410° F. and lesser amounts, but in approximately the same proportions, in the other two polymers. The highest individual values were observed for GR-S X-478 at mixing temperatures above 430° F.

REINFORCEMENT. The modulus increases. The effect is most pronounced with GR-S X-478 (41° F.) and least pronounced with natural rubber (Figures 13, 14, and 15). The tensile strength decreases. The effect is most pronounced with GR-S-10 (122° F.) up to maximum stock temperatures of 410° F. At higher maximum stock temperatures the effect is then most pronounced with GR-S X-478 (41° F.) (Figures 16, 17, and 18). The elongation at break becomes shorter. The effect is most pronounced with natural rubber. There is very little effect on the hardness of the three polymers. However above the maximum stock temperature of 410° F. the hardness of GR-S X-478 (41° F.) definitely increases. The rebound increases and the effect is most pronounced with natural rubber. The resistance to abrasion increases. The effect is most pronounced with GR-S X-478 (41° F.) and least pronounced with GR-S-10 (122° F.). The resistance to flex cut-growth increases in the case of GR-S-10 (122° F.) and natural rubber, but decreases in the case of GR-S X-478 (41° F.) (Figures 10, 11, and 12). The heat build-up decreases.

Effects of High-Temperature Mixing of GR-S X-478 (41° F.), GR-S-10 (122° F.), and Natural Rubber with the Very Fine Furnace (VFF) Gas-Base Carbon Black, Statex-K

With increase in maximum stock temperature, the fol-

lowing effects are noted in the processing and reinforcement of each polymer (Tables 3-5).

PROCESSING. The power consumption decreases. The effect is about alike for the three polymers. The extrusion rate increases in the case of GR-S-10 (122° F.), but holds practically constant for GR-S X-478 (41° F.), and decreases in the case of natural rubber. The shrinkage of the mill stocks increases in the case of GR-S X-478 (41° F.) and natural rubber. The effect is more pronounced with the GR-S X-478 (41° F.). The shrinkage decreases in the case of GR-S-10 (122° F.) (Figures 7-9). The compound viscosity decreases in the case of natural rubber. It is fairly constant for the two GR-S polymers up to maximum stock temperatures of about 375° F. At higher maximum stock temperatures their compound viscosities increase (Figures 1-3). The time to scorch for natural rubber remains practically unchanged. However, it increases sharply in the case of GR-S X-478 (41° F.) up to a maximum stock temperature of 376° F., but starts to decrease at higher maximum stock temperatures (Figures 4-6). The time to scorch in the case of GR-S-10 (122° F.) tends to decrease.

The bound rubber and gel increase. However, in the case of natural rubber they decrease sharply above the maximum stock temperature of 395° F. The highest amounts are found in GR-S-10 (122° F.) and the least in GR-S X-478 (41° F.).

REINFORCEMENT. The modulus increases. The effect is most pronounced with GR-S X-478 (41° F.) and least pronounced with natural rubber (Figures 13-15). The tensile strength decreases. The effect is practically alike for the three polymers (Figures 16-18). The elongation at break becomes shorter. The effect is practically alike for the three polymers. There is very little change in the hardness of the three polymers. The rebound increases in the case of GR-S X-478 (41° F.) up to maximum stock temperatures of 416° F., but decreases at higher maximum stock temperatures. The rebound also increases for natural rubber up to maximum stock temperatures of 395° F., but starts to decrease at higher maximum stock temperatures. The rebound remains practically unchanged in the case of GR-S-10 (122° F.). The resistance to abrasion increases in the case of natural rubber but remains practically unchanged for the two GR-S polymers. The resistance to flex cut-growth increases in the case of GR-S-10 (122° F.) and natural rubber, but decreases in the case of GR-S X-478 (41° F.) (Figures 10-12). The heat build-up decreases somewhat for the three polymers.

Effects of High-Temperature Mixing of GR-S X-478 (41° F.), GR-S-10 (122° F.), and Natural Rubber with the Reinforcing Furnace (RF) Oil-Base Carbon Black, Kosmos 60-Dixie 60

With increase in maximum stock temperature, the following effects are noted in the processing and reinforcement of each polymer (Tables 3-5).

PROCESSING. The power consumption decreases. The effect is most pronounced with natural rubber and least pronounced with GR-S X-478 (41° F.). The rate of extrusion increases slightly in the case of GR-S-10 (122° F.). It remains practically unchanged in the case of GR-S X-478 (41° F.) and natural rubber for maximum stock temperatures in the range of 325° F. to 375° F. The shrinkage of the mill stocks decreases in the case of GR-S-10 (122° F.) and natural rubber. It increases in the case of GR-S X-478 (41° F.) (Figures 7-9). The compound viscosity increases in the case of the two GR-S polymers, but decreases in the case of natural rubber (Figures 1-3). The time to scorch decreases in the case of GR-S-10 (122° F.) and natural rubber. It increases in the case of GR-S X-478 (41° F.) up to maximum stock temperatures of 372° F., but decreases at higher maximum stock temperatures (Figures 4-6). The bound rubber and gel increase. However in the case of natural rubber they decrease above the maximum stock temperature of 372° F. The highest amounts are found in GR-S-10 (122° F.) and lesser amounts, but in approximately the same proportions, in the other two polymers.

REINFORCEMENT. The modulus increases. The effect is most pronounced with GR-S X-478 (41° F.) and least pronounced with natural rubber (Figures 13-15). The tensile strength, at or about the optimum cure, changes very little for the three polymers up to maximum stock temperatures of about 330-375° F., but starts decreasing at higher maximum stock temperatures (Figures 16-18). The elongation at break becomes shorter, and the effects are practically alike for the three polymers.

There is very little effect on the hardness of the three polymers. The rebound in the case of natural rubber is at a maximum at the maximum stock temperature of 326° F. and starts to decrease at a higher maximum stock temperature. The rebound of GR-S-10 (122° F.) is practically unchanged; that of GR-S X-478 (41° F.) remains constant up to a maximum stock temperature of 408° F., and starts to increase at a higher maximum stock temperature. The resistance to abrasion increases in the case of natural rubber, but remains practically unchanged in the case of the two GR-S polymers. The resistance to flex cut-growth remains about the same in the case of GR-S-10 (122° F.) and decreases in the case of GR-S X-478 (41° F.) and natural rubber (Figures 10-12). The heat build-up decreases somewhat for the three polymers up to maximum stock temperatures of close to 400° F., but tends to increase at higher maximum stock temperatures.

Effects of High-Temperature Mixing of GR-S X-478 (41° F.), GR-S-10 (122° F.), and Natural Rubber with the High Abrasion Furnace (HAF) Oil-Base Carbon Black, Philblack 0

With increase in maximum stock temperature, the following effects are noted in the processing and reinforcement of each polymer (Tables 3-5).

PROCESSING. The power consumption decreases. The effect is most pronounced with GR-S X-478 (41° F.) and least pronounced with GR-S-10 (122° F.). The rate of extrusion remains practically unchanged in the case of GR-S-10 (122° F.) and natural rubber, but decreases in the case of GR-S X-478 (41° F.). The shrinkage of the mill stocks increases in the case of GR-S X-478 (41° F.), but decreases in the case of GR-S-10 (122° F.) and natural rubber (Figures 7-9). The compound viscosity increases in the case of the two GR-S polymers, but decreases in the case of natural rubber (Figures 1-3). The time to scorch increases in the case of GR-S X-478 (41° F.) and attains a maximum at stock temperatures between 330 and 376° F., but starts to decrease at higher maximum stock temperatures. The time to scorch for GR-S-10 (122° F.) decreases, but remains practically constant at maximum stock temperatures in the range of 325 to 383° F. The time to scorch for natural rubber decreases (Figures 4-6). The bound rubber and gel increase. However in the case of natural rubber, they decrease above the maximum stock temperature of 330° F. Highest amounts are found in GR-S-10 (122° F.).

REINFORCEMENT. The modulus increases. The effect is most pronounced in the case of the two GR-S polymers. The modulus of natural rubber decreases above the maximum stock temperature of about 330° F. (Figures 13-15). The tensile strength decreases. The effect is most pronounced with natural rubber above the maximum stock temperature of about 330° F. (Figures 16-18). The elongation at break becomes shorter, and the effects are practically alike for the three polymers. The hardness is unaffected in the case of the two GR-S polymers, but tends to decrease in the case of natural rubber. The rebound increases in the case of GR-S X-478 (41° F.) and natural rubber, but remains practically unchanged in the case of GR-S-10 (122° F.). The resistance to abrasion increases slightly in the case of natural rubber, but remains practically unchanged in the case of the two GR-S polymers. The resistance to flex cut-growth tends to increase in the case of natural rubber, but decreases in the case of the two GR-S polymers (Figures 10-12). The heat build-up increases slightly in the case of natural rubber, but decreases slightly in the case of the two GR-S polymers.

Effects of High-Temperature Mixing of GR-S X-478 (41° F.), GR-S-10 (122° F.), and Natural Rubber with the High Abrasion Furnace (HAF) Oil-Base Carbon Black, Vulcan 3

With increase in maximum stock temperature, the following effects are noted in the processing and reinforcement of each polymer (Tables 3-5).

PROCESSING. The power consumption decreases. The effect is slightly more pronounced with natural rubber and less pronounced with the GR-S polymers. The rate of extrusion remains practically unchanged in the case of GR-S-10 (122° F.) but decreases in the case of GR-S X-478 (41° F.) and natural rubber. The shrinkage of the mill stocks increases in the case of GR-S X-478 (41° F.), but decreases in the case of natural rubber. The shrinkage in the case of GR-S-10 (122° F.) remains practically unchanged up to maximum stock temperatures of 374° F., but decreases at higher maximum stock temperatures (Figures 7-9). The compound viscosity increases in the case of the two GR-S polymers, but decreases in the case of natural rubber (Figures 1-3). The time to scorch increases in the case of GR-S X-478 (41° F.), but remains practically unchanged in the case of GR-S-10 (122° F.) and natural rubber (Figures 4-6). The bound rubber and gel increase. However in the case of natural rubber they decrease above the maximum stock temperature of 335° F. Higher amounts are found in GR-S-10 (122° F.).

REINFORCEMENT. The modulus increases. The effect is more pronounced with the two GR-S polymers. The modulus of natural rubber reaches a maximum at a maximum stock temperature of 335° F. and starts to decrease at higher maximum stock temperatures (Figures 13-15). The tensile strength in the case of GR-S-10 (122° F.) and natural rubber decreases. The effect is more pronounced in the latter. Tensile strength remains practically unchanged for GR-S X-478 (41° F.) (Figures 16-18). The elongation at break becomes shorter. The effect is practically alike for the three polymers.

The hardness is affected but very little in the case of the two GR-S polymers. It decreases in the case of natural rubber. The rebound increases in the case of GR-S X-478 (41° F.), but remains practically unaffected in the case of GR-S-10 (122° F.) and natural rubber. In the case of natural rubber, however, the rebound decreases materially above a maximum stock temperature of 406° F. The resistance to abrasion is very slightly increased in the case of natural rubber, but remains practically unchanged in the case of the two GR-S polymers. The resistance to flex cut-growth decreases materially (Figures 10-12). The heat build-up increases in the case of GR-S-10 (122° F.) and natural rubber. It decreases very slightly for GR-S X-478 (41° F.).

Conclusions

High-temperature mixing (in the neighborhood of 375° F., as is being recommended for commercial mixings) of fully reinforcing carbon blacks in "cold rubber," GR-S X-478 (41° F.), will result in lower power consumption, higher compound viscosity, not much increase in shrinkage for furnace blacks and practically no change for channel black, less scorch for furnace blacks and more for channel black, more bound rubber and gel for channel black and slightly less for furnace black, higher modulus, in general little change in tensile strength or in hardness, shorter elongation, higher rebound, better resistance to abrasion for channel black and unchanged for furnace blacks, lower resistance to flex cut-growth, and lower heat build-up.

Likewise, high-temperature (375° F.) mixing of fully reinforcing carbon blacks in GR-S-10 (122° F.) will result in lower power consumption, higher rate of extrusion, less shrinkage, higher compound viscosity for oil-base furnace blacks, lower for channel black, and no change for the gas-base furnace black, more scorch in the case of the channel black and all except Vulcan 3 of the furnace blacks, more bound rubber and gel, higher modulus, lower tensile strength, shorter elongation, very little change in hardness, rebound, and heat build-up, lower resistance to cut-growth for oil-base furnace blacks and but little change for channel black, improved resistance to abrasion for channel black and practically no change for furnace blacks.

Similarly high-temperature (375° F.) mixing of fully reinforcing carbon blacks in natural rubber will result in lower power consumption, lower rate of extrusion, lower compound viscosity, less shrinkage, more scorch in the case of the channel black and in all except Vulcan 3 of the furnace blacks, more bound rubber and gel for channel and gas-base furnace black and very little change for oil-base furnace blacks, higher modulus, lower tensile strength, shorter elongation, higher rebound, no change in hardness, slight increase in resistance to abrasion, higher resistance to flex cut-growth for channel and gas-base furnace black and less resistance for oil-base furnace blacks, slight increase in heat build-up for oil-base furnace blacks and a slight decrease for channel black and gas-base furnace black.

Rubber Output Down in Indo-China

The amount of rubber produced in Indo-China in the first quarter of 1949 declined to 5,477 metric tons from 6,769 tons in the corresponding period of 1948. Practically all the rubber in the 1949 period was produced in January and March, with February accounting for only 428 tons. Such low outputs are normal in February, however, since the Chinese New Year holidays coincide with the height of the wintering season, when many plantations stop tapping.

According to preliminary statistics from the Rubber Office, 18,693 metric tons of rubber were exported in the first five months of 1949, against 14,046 metric tons in the same period of 1948. France took 95% of the 1949 shipments.

Low-Temperature Rubber—Evaluation of Various Mercaptans in the Custom Recipe at 41° F.—I

J. E. Troyan[1] and C. M. Tucker[1]

IMPROVED quality chemical rubber made at low temperature (1)[2] was assured a dominant position in the synthetic rubber industry, following several years of development and evaluation, when in October, 1948, the Reconstruction Finance Corp. approved (2) conversion of an additional 162,000 long tons of annual government plant capacity to operation at 41° F. Even before this industry-wide expansion was authorized, the "cold rubber" process had actually been in limited production in several of the standard plants. Of these plants, Copolymer Corp., Baton Rouge, La., had been producing the 41° F. polymer (X-435-GR-S or X-485-GR-S) at an annual rate of 15,000 long tons (50% of plant capacity) since February, 1948 (3). Subsequent to that time two other companies converted smaller portions of their plants, totaling 6,000 tons more capacity, to permit large-scale experimental production of the new polymer.

The polymerization recipe which has been used by these plants is an adaptation of a redox system embodying modifications proposed by the University of Minnesota and Phillips Petroleum Co. (3). It was used by Phillips in 1946 and early 1947 for the production of sizable quantities of "cold" rubber, which were used in the first comprehensive factory and tire test program. It is commonly identified as the cumene hydroperoxide-redox recipe and contains the following ingredients, expressed in parts per 100 parts of monomers; 180 water, 72 butadiene, 28 styrene, 4.7 Dresinate[3] 731 (disproportionated rosin soap), 0.2 mixed tertiary mercaptans (MTM), 0.1 sodium hydroxide, 0.5 trisodium phosphate dodecahydrate, 3.0 dextrose, 0.1 ferrous sulfate heptahydrate, 0.6 tetrasodium pyrophosphate, and 0.1 cumene hydroperoxide (CHP).

Reaction times to 60% conversion with this recipe averaged 16 hours in the pilot plant and have varied from 18 to 24 hours and longer in the plants. By contrast, standard GR-S runs at 122° F. reach 72% conversion in about 14 hours (3).

In order to increase these reaction rates at low temperature and thereby insure plant operation at design capacity, an improved redox formula termed the "Custom" recipe has been developed by Phillips. The new system substitutes potassium for sodium pyrophosphate, requires only one part of dextrose, and replaces Dresinate 731 by the corresponding potassium soap, Dresinate 214. Runs using this recipe at 41° F. average 13 hours to 60% conversion. In addition to this much faster rate, the new formula also results in considerably improved latex stability. As a consequence, the frequency of shutdowns to remove latex precoagulum deposited in process equipment is substantially reduced.

Since the Custom recipe will undoubtedly find extensive application in the low-temperature polymerization program—Copolymer Corp. is already producing substantial amounts of X-478-GR-S with a minor modification of the Custom recipe (4)—a comprehensive study was made in the Phillips pilot plant to determine the effect of using different mercaptans in the formulation. Included in this study were Phillips' tertiary dodecyl mercaptan (Sulfole[4]), tertiary hexadecyl mercaptan, and mixed tertiary mercaptans (MTM), in addition to the commercial normal dodecyl mercaptan (DDM) (5). Rates of mercaptan depletion and the changes in combined styrene content, Mooney viscosity, and inherent viscosity with conversion were established. The effect of agitation on depletion of t-dodecyl mercaptan (Sulfole) and DDM was also determined. Experimental data are summarized and discussed in this paper.

Experimental Details

Polymerizations were carried out in a 20-gallon, jacketed, Type 304 stainless steel reactor. The reactor is equipped with a variable-speed agitator drive permitting stirrer speeds of 59 to 352 rpm. Agitation is provided by a 12-inch impeller, which was run at 200 or at 300 rpm. during this investigation. The polymerization temperature was controlled at 41° F. by circulating a propane-refrigerated stream of methanol through the reactor jacket. A detailed description of the control system has been given by Hightower (6).

The following variations of the Custom recipe were used during this program:

	Recipe (1)	Recipe (2)
Water	180	180
Butadiene	72	72
Styrene	28	28
Dresinate 214	4.7	4.7
NaOH	0.13	0.13
$Na_3PO_4.12H_2O$*	0.50	...
CHP (100)%)†	0.10	0.10
$K_4P_2O_7$	0.177	0.177
$FeSO_4.7H_2O$	0.14	0.14
KCl*	...	0.50
Daxad	0.10	0.10
Dextrose	1.0	1.0
Modifier	variable	variable
pH of soap solution	11.2	10.7

*Trisodium phosphate and KCl were used interchangeably as viscosity-reducing electrolytes. Otherwise recipes were identical.
†Cumene hydroperoxide.

The materials were charged to the reactor in the following order: (1) dextrose-soap solution; (2) activator, when temperature of above solution is approximately 41° F.; (3) styrene and mercaptan; (4) butadiene; (5) cumene hydroperoxide, when batch temperature reached 41° F.

The dextrose-soap solution was prepared as follows in a 20-gallon soap make-up tank: The dextrose and 0.04-part sodium hydroxide were added to 40 parts of water which had been heated to 160° F. The resulting alkaline sugar solution was maintained at this temperature for 30 minutes to insure digestion of sugar, after which it was cooled to 120-125° F. The drop in pH during this period varied between 0.5 and 0.8 pH unit. Prior to the dissolving of the remaining sodium hydroxide, the Dresinate, electrolyte, and 30 parts of water were added. This addition made a total of 70 parts water for sugar-soap solution, which amount is commonly used in GR-S plants for soap preparation. The remaining water, less the amount in the soap, was added to the sugar-soap solution before charging.

The activator was prepared by dissolving the ferrous sulfate in six parts of water, with the solid potassium pyrophosphate (KPP) being added to this solution. The resultant mixture was diluted with four parts of water; then it was heated to 140° F. and cooled to room temperature before charging.

Following the charging of the above materials, the reactor was pressured with nitrogen to 30 p.s.i. to facilitate sampling.

[1] Phillips Petroleum Co., research department, Bartlesville, Okla.
[2] Numbers in parentheses refer to Bibliography items at end of this article.
[3] Registered trade mark (U. S. Patent Office) of Hercules Powder Co.
[4] Registered trade mark of Phillips Petroleum Co.

The rate of polymerization was followed by solids determinations, which were obtained with the hypodermic syringe technique (1). Consumption of mercaptan during the polymerization periods was followed by the silver nitrate amperometric titration procedure developed by Kolthoff and Harris (8). The polymer samples for inherent viscosity and styrene content were obtained by alcohol-brine coagulation; whereas samples used to determine Mooney rise were obtained by the same technique, as well as by brine-acid coagulation. The former procedure was used in addition to the standard brine-acid coagulation in an attempt to obtain a better correlation between Mooney and per cent conversion. It seemed feasible that a more consistent acid and soap content of the rubber would be obtained with alcohol-brine coagulation.

The polymerizations were shortstopped at the desired conversion in the 50-gallon glass-lined stripper with 0.15-part dinitrochlorobenzene (DNCB) based on the monomers charged. The unreacted butadiene was removed from the latex by heating to 100-110° F. and using a vacuum of 20-22 inches of mercury. The remaining styrene was steam stripped from the latex at 140° F. under the same vacuum.

The stripped latex was stabilized with 1.5% phenyl beta napthylamine, based on the rubber. Coagulation was accomplished with the standard brine-acid technique. The crumb was given two acid water washes (pH 2.0-3.0) at 120° F., after which it was dried 10 hours at 160° F.

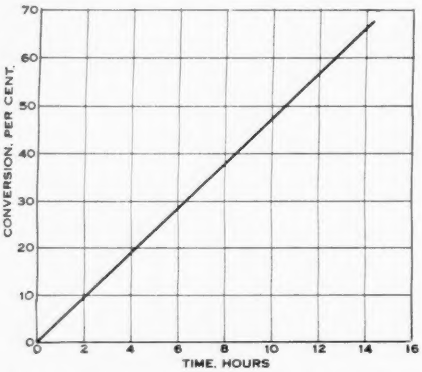

Fig. 1. Polymerization Rates with the Custom Recipe Using Various Mercaptans

Polymerization Rates

Earlier work in this pilot plant with the original CHP-redox recipe described by Shearon *et al.* (3) demonstrated that the polymerization rate was not affected by the type of mercaptan. Later experiments with the Custom recipe, which are discussed in this report, revealed that neither the concentration nor the type of mercaptan had any pronounced influence on the polymerization rates.

In Table 1 are summarized polymerization data for the 60% conversion runs utilizing all mercaptans evaluated during this program. Average results are also shown graphically in Figure 1. No attempt was made to differentiate between individual mercaptans in plotting the data, since the observed variations in polymerization rates were considered within the range of experimental error. A very uniform rate of reaction is indicated by the figure. Marked retardation in two runs (20-191 and 20-160) was attributed to over-digestion of the dextrose.

A study of Custom Recipe 2 (containing KCl) in 70 to 80% conversion runs was conducted with all modifiers except t-hexadecyl mercaptan. Reaction data are given in Table 2. The following average times to 60 and 72% conversion were calculated from the results in Tables 1 and 2. Figures in parentheses indicate the number of batches averaged. As indicated in footnotes to these tables, three of the 22 runs were not included in the averages because the times were too far from the mean and would have been given too much weight in such calculations. Typical runs averaged 12 to 13 hours to 60% and about 15 hours to 72% conversion for the various mercaptans.

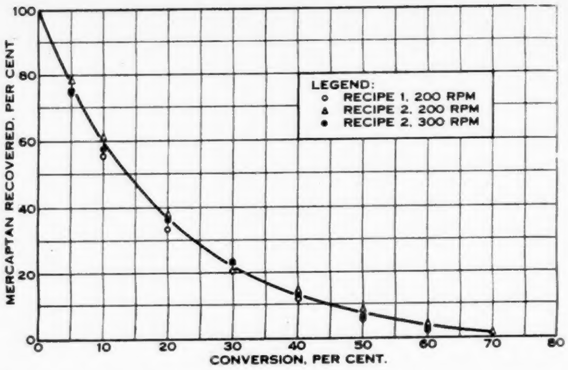

Fig. 2. Disappearance of t-Dodecyl Mercaptan in 41° F. Custom Recipe

AVERAGE TIMES TO 60% AND 72% CONVERSION

Mercaptan	Time in Hours to 60% Conv.	72% Conv.
t-Dodecyl (Sulfole)	12.2 (7)	14.8 (3)
MTM	13.0 (5)	15.5 (2)
t-Hexadecyl	12.7 (2)	......
1:1 Blend	11.8 (2)	14.2 (1)
DDM	12.2 (3)	14.2 (1)

Consumption of Mercaptans during Polymerization

The rate of disappearance for the following mercaptans was established in the 41° F. Custom recipe: tertiary dodecyl mercaptan (Sulfole), MTM (3:1:1 blend of t-C_{12}, t-C_{14} and t-C_{16} mercaptans), tertiary hexadecyl mercaptan, a 1:1 blend of tertiary dodecyl and tertiary hexadecyl mercaptans, and DDM (mixture of normal C_{10}, C_{12}, and C_{14} mercaptans, predominately C_{12}). All tertiary mercaptans studied during this program were manufactured by Phillips Petroleum. DDM has been used as the standard modifier in the government-owned synthetic rubber plants.

The mercaptan sulfur content of these mercaptans is shown below:

Mercaptan	% Mercaptan Sulfur
DDM	13.64
t-Dodecyl (Sulfole)	15.47
t-Hexadecyl	10.28
MTM (Serial 4)	13.23
1:1 Blend (t-C_{12}, t-C_{16} mercaptans)	12.60

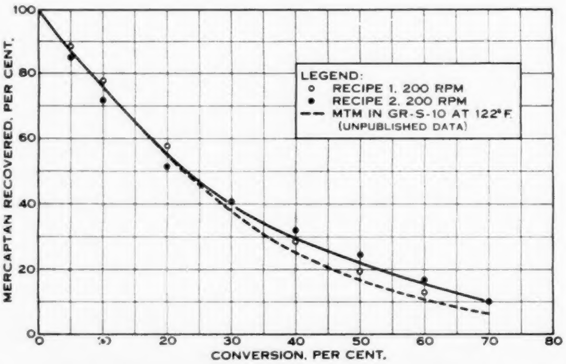

Fig. 3. Disappearance of MTM in 41° F. Custom Recipe

Table 1. Polymerization Rates Using Various Mercaptans in the Custom Recipe at 41° F.

(60% Conversion)

Run No.	Mercaptan, Part	% Conversion at Time, Hours							Final		
		1	2	4	6	8	10	12	Time, Hours	Conv., %	Mooney Viscosity ML-4
					t-C_{12} Mercaptan (Sulfole)						
20-151	0.21	5.4	10.2	19.7	28.9	38.0	48.4	....	11.7	61.6	36
20-158	0.18	4.9	9.5	18.9	28.4	37.6	47.3	....	12.5	59.1	60
20-191*	0.18	4.0	8.0	15.2	22.1	29.0	35.8	42.7	17.1	60.3	59
20-192	0.18	4.9	9.2	18.0	26.7	35.3	43.9	53.1	13.7	61.5	59
20-193	0.18	5.4	10.9	20.6	30.4	40.3	50.2	....	11.8	59.1	55
Avg.			10.0	19.3	28.6	37.8	47.5		12.7	60.3	
					MTM						
20-148	0.24	4.3	10.3	19.8	28.4	35.9	44.2	55.4	12.8	59.8	53
20-153	0.24	4.6	9.5	19.0	28.1	37.9	47.3	57.2	13.0	62.0	57
20-160*	0.24	2.9	6.0	23.5	22.1	29.8	37.9	45.9	15.6	60.0	60
20-161	0.27	5.6	11.3	21.4	30.4	38.4	45.8	53.6	13.6	59.4	47
Avg.			10.4	20.1	29.0	37.4	45.8		13.1	60.4	
					t-C_{16} Mercaptan						
20-150	0.60	5.9	11.4	21.1	30.0	38.4	46.7	55.0	13.3	59.6	69
20-154	0.60	6.5	11.4	20.9	30.7	40.2	50.0	....	12.1	60.0	74
Avg.			11.4	21.0	30.4	39.1	48.4		12.7	59.8	
					1/1 Blend (t-C_{12}, t-C_{16} Mercaptans)						
20-156	0.30	4.8	9.4	19.1	29.5	39.8	50.7	....	12.0	61.6	52
					DDM						
20-152	0.30	5.1	9.9	20.0	30.0	39.5	50.0	....	11.9	60.0	73
20-155	0.30	3.3	6.5	14.2	22.9	31.9	41.6	53.0	13.5	59.6	60
Avg.			8.4	17.1	26.4	35.7	45.8		12.7	59.8	

*Not included in averages.

Table 2. Polymerization Rates Using Various Mercaptans in the Custom Recipe at 41° F.

(70-80% Conversion)

Run No.	Mercaptan, Part	% Conversion at Time, Hours						Time, 60% Conv.	Hours to 72% Conv.	Final		
		2	5	8	11	14	17			Time, Hours	Conv., %	Mooney Viscosity ML-4
						t-C_{12} Mercaptan (Sulfole)						
20-164	0.26	11.5	27.5	43.0	56.8	68.5	77.7	11.7	15.0	20.0	83.7	74
20-166	0.25	12.8	28.9	40.9	58.2	72.2	....	11.4	13.9	14.2	73.4	58
20-180	0.26	10.0	24.4	38.1	59.9	65.4	75.9	12.8	15.6	23.5	88.9	100
						MTM						
20-162	0.28	10.5	23.2	36.1	49.0	62.0	73.4	13.5	16.5	20.5	78.8	84
20-165	0.29	11.3	21.6	40.7	55.6	70.3	....	12.0	14.5	14.5	72.0	58
						1/1 Blend (t-C_{12}, t-C_{16} Mercaptans)						
20-173	0.37	10.5	25.8	41.3	56.8	....	....	11.7	14.2	14.1	71.7	43
						DDM						
2 0-163	0.40	11.7	29.3	45.3	59.6	71.0	79.9	11.2	14.2	18.9	83.7	83
20-167*	0.45	11.0	23.3	34.8	46.0	56.0	64.5	15.3	20.5	19.8	70.4	56

*Not included in averages.

Table 3. Disappearance of Various Mercaptans in the 41° F. Custom Recipe

Run No.	Mercaptan, Part	Recipe	% Mercaptan Recovered at % Conversion							
			5	10	20	30	40	50	60	70
				t-Dodecyl (Sulfole)						
20-158	0.18	1	75.5	55.5	32.0	21.0	13.5	8.0	3.5	....
20-191	0.18	1	73.0	56.0	34.5	20.0	10.0	5.1	1.5	....
Average			74.3	55.8	33.3	20.5	11.8	6.6	2.5	....
20-166	0.26	2	83.0	67.0	41.0	23.5	14.5	9.0	5.0	2.0
20-180	0.26	2	74.0	57.0	37.5	25.0	15.5	9.0	4.0	1.2
20-192	0.18	2	78.0	59.5	36.0	22.5	13.0	7.0	3.0	....
Average			78.3	61.2	38.2	23.7	14.3	8.3	4.0	1.6
20-193 (300 r.p.m.)	0.18	2	75.0	57.5	36.5	23.5	13.0	6.0	2.0	
					MTM					
20-148	0.24	1	88.0	77.0	57.0	40.0	28.0	19.0	11.5	....
20-153	0.24	1	88.5	78.0	58.0	41.5	28.5	20.0	14.0	
Average			88.3	77.5	57.5	40.5	28.3	19.5	12.8	
20-162	0.28	2	84.0	70.0	51.0	42.0	34.0	26.0	18.5	11.0
20-165	0.29	2	86.0	73.0	52.5	39.5	30.0	22.5	15.0	9.0
Average			85.0	71.5	51.7	40.7	32.0	24.3	16.8	10.0
					t-Hexadecyl					
20-150	0.60	1	94.5	89.0	78.0	67.5	57.0	47.0	38.5	....
20-154	0.60	1	94.0	88.5	77.5	66.5	56.0	46.0	36.0	....
Average			94.8	88.8	77.8	67.0	56.5	46.5	37.3	....
				1:1 Blend (t-C_{12}, t-C_{16} Mercaptans)						
20-156	0.30	1	90.0	80.0	62.0	47.5	38.0	30.5	24.0	
20-173	0.37	2	89.0	78.5	61.0	45.0	34.5	26.0	20.5	15.5
					DDM					
20-152	0.30	1	75.0	64.5	51.0	41.0	33.0	24.5	16.0	....
20-155	0.30	1	79.0	66.5	50.5	40.0	32.5	26.0	21.0	....
Average			77.3	65.5	51.8	40.5	32.8	25.3	18.5	....
20-163	0.40	2	88.0	77.0	61.0	51.0	43.0	35.0	28.0	19.5
20-167	0.45	2	85.5	78.0	65.0	54.0	43.0	32.5	22.5	13.0
Average			86.7	77.5	63.0	52.5	43.0	33.8	26.3	16.2
20-177 (300 r.p.m.)	0.30	2	81.0	67.0	52.5	43.0	36.0	28.0	19.0	....

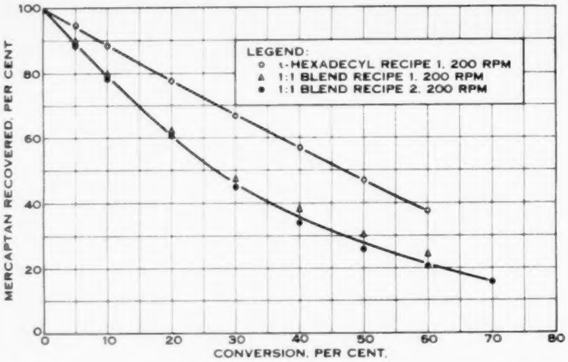

Fig. 4. Disappearance of 1:1 Blend and t-Hexadecyl Mercaptan in 41° F. Custom Recipe

Inasmuch as Kolthoff and Harris (9) found that the percentage of unreacted mercaptan remaining in the latex at a given conversion is independent of the initial concentration, it was possible to vary the amount of mercaptan in the charge without affecting the depletion results. Concentrations of the various mercaptans were therefore adjusted in order to obtain polymers with Mooney viscosities in a desirable range for physical evaluation.

In Table 3 are given the mercaptan disappearance data for the individual modifiers studied during this investigation. Results are shown graphically in Figures 2 to 5. The individual disappearance curves of these mercaptans are all compared in Figure 6.

Earlier work in the Phillips pilot plant with the Custom recipe had shown that the polymerization rate was not affected by substituting potassium chloride for trisodium phosphate (TSP). For that reason this investigation was expanded to include a study of both systems, which have been described in a previous section of this paper as Custom Recipe 1 (TSP) and Recipe 2 (KCl).

The main effect experienced, when TSP was replaced with KCl, was a lowering of pH amounting to 0.4 to 0.6 unit. The results obtained with the two recipes show the tertiary mercaptans to be unaffected by the pH of the system; whereas DDM depletes more rapidly at the higher pH. Similar observations have been made by Kolthoff and Harris (9) for these mercaptans in the GR-S recipe at 122° F. Average data given in Table 3 for each mercaptan in Recipes 1 and 2 were used in plotting Figures 2 to 5.

Also included in Figures 3 and 5 for comparison are the disappearance data for MTM and DDM in the GR-S-10 system at 122° F. These results reveal that the disappearance rates for MTM in the Custom and

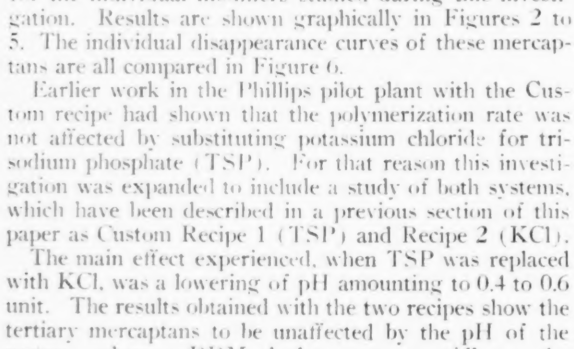

Fig. 5. Disappearance of DDM in 41° F. Custom Recipe

GR-S-10 recipes are essentially the same; whereas DDM is consumed at a much slower rate in the Custom recipe. It should be mentioned that even though the depletion rates of MTM in the Custom and GR-S-10 recipes are about the same, the modifier requirement for the 41° F. recipe at 72% conversion is approximately 75% of that reported (9) necessary for the same Mooney at 72% conversion in the GR-S-10 system at 122° F. On the other hand the DDM requirement in the 41° F. system is approximately 65% of that used in the GR-S-10 recipe. Thus another advantage of 41° F. operation over the GR-S-10 system at 122° F. is the reduction in modifier requirement with either-type mercaptan.

Recipe 2 was used in studying the effect of agitation on the consumption of DDM and Sulfole during this program. Agitator speed was increased from the standard level of 200 r.p.m. to 300 r.p.m. The data obtained show that the disappearance of Sulfole is not affected by the degree of agitation, although it is increased considerably for DDM at the higher speed. The same effect was observed by Kolthoff and Harris (9) for these modifiers in the GR-S recipe at 122° F. It is interesting to note that essentially the same disappearance rate for DDM was obtained with Recipe 2 (KCl, pH 10.7) with agitator speed of 300 r.p.m. as found with Recipe 1 (TSP, pH 11.2) at 200 r.p.m.

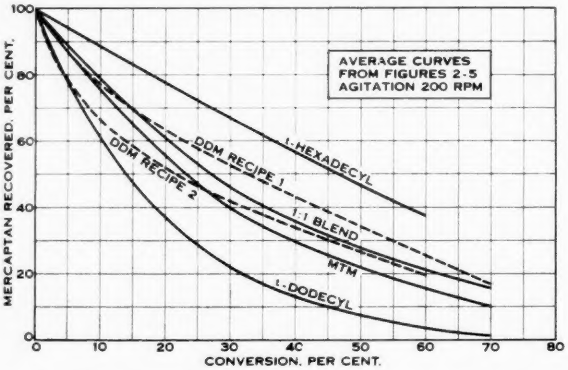

Fig. 6. Disappearance of Various Mercaptans in 41° F. Custom Recipe

Although the effect of agitation on the consumption of t-hexadecyl mercaptan was not studied during this investigation, it was observed (10) in the Phillips pilot plant during earlier work at 41° F. that depletion of this mercaptan will change with the agitation. The variation is approximately the same as experienced with DDM.

Finally, it should be pointed out that the consumption of DDM and tertiary mercaptans is not affected by the rate of conversion. Data bearing out this observation are included in Tables 1, 2 and 3.

Bibliography

(1) W. A. Schulze, W. B. Reynolds, C. F. Fryling, L. R. Sperberg, J. E. Troyan, India Rubber World, 117, 739 (1948).
(2) *Ibid.*, 119, 75 (1948).
(3) W. H. Shearon, J. P. McKenzie, M. B. Samuels, *Ind. Eng. Chem.*, 40, 769 (1948).
(4) India Rubber World, 119, 80 (1948).
(5) R. F. Dunbrook, *Ibid.*, 117, 355 (1947).
(6) *Chem. Eng.*, 55, 100 (1948).
(7) R. J. Houston, *Ind. Eng. Chem. (Anal. Ed.)*, 20, 49 (1948).
(8) I. M. Kolthoff, W. E. Harris, *Ibid.*, 18, 161 (1946).
(9) *J. Polymer Sci.*, 2, 49 (1947).
(10) Phillips Petroleum Co., unpublished data.
(11) *J. Polymer Sci.*, 1, 318 (1946).
(12) W. P. Tyler, T. Higuchi, India Rubber World, 116, 635 (1947).
(13) "Specifications for Government Synthetic Rubbers (Revised Edition)—Effective January 1, 1949," Office of Rubber Reserve, Reconstruction Finance Corp., Washington, D. C. (1949).

(To be continued)

EDITORIALS

Improved Quality, Not Government Edict the Answer to Increased American Natural Rubber Use

THERE is a very important point in connection with the wording of the official communique which was issued following the Tri-Partite Monetary Conference in Washington during the week of September 12 that we feel warrants elaboration for the special benefit of the producers of natural rubber.

Article 9 of this communique, which deals with rubber, states in part:

"The United States representatives reported that the United States Government was prepared to take steps to open to natural rubber a substantial additional area of competition, including a modification of the government order relating to the consumption of synthetic rubber."

Note particularly the phrase, "open to natural rubber a substantial additional area of competition." On September 28 the Department of Commerce modified the government order by reducing the mandatory consumption requirements for synthetic rubber for American tire and tube manufacturers by 35,000 long tons per year of GR-S and 15,000 tons of GR-I, or Butyl rubber. It should be emphasized that by this action we do not guarantee to buy 50,000 tons of natural rubber a year, we have merely "opened an additional area of competition," unless the price and the quality of the natural rubber are such that it is more attractive to American consumers than an equivalent amount of synthetic rubber.

In view of the recent devaluation of the currency of the sterling bloc countries, it is more than usually difficult to estimate the future trend of the price of natural rubber. One line of thought suggests that if an English pound's worth of natural rubber before devaluation brought \$4.03, and now brings only \$2.80, in order to obtain even the same number of dollars the English pound price would need to be higher. There are many other factors, of course, that influence the price of natural rubber, the most important of which are those of supply and demand and quality. It is well established now that the basic need of the natural rubber producing countries is to obtain more dollars for their rubber, and this plan may be accomplished by selling more rubber in the United States, and at a higher price, or both.

Synthetic rubber in the United States is clean, uniform in composition and quality, and well packaged. It has recently been announced by the Office of Rubber Reserve that shipments of GR-S, beginning October 1, will be accompanied by physical test data obtained with the strain tester developed by the National Bureau of Standards, in addition to the usual modulus data at fixed elongation. This strain test instrument, described in India RUBBER WORLD about a year ago, has demonstrated its superior ability to evaluate the properties of various rubbers with maximum accuracy.

Natural rubber received in the United States is and has been since the end of the war, in general, dirty, improperly or inaccurately graded, poorly packaged, variable in composition and properties, and, except in very few instances, not accompanied by any information regarding physical or other properties.

India RUBBER WORLD in July, 1948, in an article and in an editorial called attention to the seriousness of this quality and packaging situation.

We were very much interested in a report in the August, 1949 issue of *The Ruber Age and Synthetics (London)* of efforts of Malayan government and certain producers and marketing organizations in Malaya to require that all rubber for export be packed by licensed persons in order to improve this packaging situation. It was added further, however, that through the influence of top officials of other natural rubber producing organizations in England, who oppose this licensing of rubber packagers and shippers as unduly "restrictive," this worthwhile proposal may never become a reality.

The United States rubber goods manufacturing and rubber trading interests have indicated to the Malayan Government their strong support of this licensing proposal. That portion of the natural rubber producing interests that opposes improvements in the packaging and grading of their rubber might well be reminded of the comment in this column in July, 1948, when, in discussing the continuing postwar downward trend of natural rubber quality, we said:

"Either this trend would have to be reversed, or the producers of natural rubber will most likely be faced with the possibility of an even lower price and an even smaller market in this country."

Quality and Uniformity of Compounding Ingredients

WHILE on the subject of quality of materials used in the manufacture of rubber products, we would like to mention the fact that a spokesman for the Office of Rubber Reserve recently stated that in its examination of samples of various commonly used compounding ingredients for the purpose of establishing lots of standard samples for the industry, it has found wider variation in the properties of some of these materials in lots from the same supplier and between different suppliers than was considered possible or desirable.

No actual data were supplied to support this statement, but as suggested by at least one major supplier of these materials, such data should be made available at once so that the suppliers may have an opportunity to check the findings of the Office of Rubber Reserve against their own production control data.

DEPARTMENT OF
PLASTICS TECHNOLOGY

Polystyrene—the Work Horse of the Thermoplastics Industry—I[1]

W. C. Goggin[2] and G. B. Thayer[2]

INDUSTRIALLY speaking, polystyrene is still a relatively new material. Only since the war has a majority of the molders had an opportunity thoroughly to investigate it. Their rapid acceptance of polystyrene is largely responsible for its phenomenal growth. During this same period material manufacturers have also gained a great deal of experience, not alone from their research laboratories, but from having worked closely with the molders. From them the material manufacturers have obtained a much better understanding of what is expected from a plastic molding material.

The molder's ideas have not fallen on deaf ears. The material manufacturers have listened to the molder's suggestions and requirements and have placed these problems in their research laboratories for investigation. Unfortunately the time involved in developing a new material may easily be five years or more. Yet research on the improvements or modifications of polystyrene has already resulted in their commercial production in many cases.

This has only been possible through the close cooperation of the molder and his material supplier. A sound knowledge of their mutual problems leads to the most rapid results. It is the purpose of this discussion to show some of the achievements resulting from this cooperation. It is its further purpose to encourage even closer cooperation and thus assure the plastics industry a sound future.

Specifically, polystyrene illustrates the value of such cooperation very well. When introduced, polystyrene had recognizable shortcomings both in molding characteristics and in physical properties. Close contact with molders showed that if the material was to enjoy a rapidly expanding future, improvements would have to be made. These improvements may be listed as follows: (1) lower cost; (2) reduced crazing and improved quality; (3) improved moldability, faster cycles, and better mold release; (4) improved toughness and elongation; (5) improved light stability; (6) improved heat resistance.

That these problems were recognized, worked on, and solutions wholly or partly obtained, is rapidly becoming a matter of record. Let us examine that record for both results and methods used in reaching those results.

Lower Cost

With a sound, basically inexpensive production process the question of lower cost is one of greatly increased production. But usually large production cannot be undertaken until there is a large market for the material; and a large market for the material is not available until costs are low. Thus the old problem of the chicken and the egg—which comes first?

Fortunately styrene has another important major use other than that of making polystyrene. It is an essential raw material for synthetic rubber. So with the wartime demand for synthetic rubber, the problem of large-scale production of styrene was solved.

It all came about this way. Historically, crude forms of styrene and polystyrene were known in the early Nineteenth Century. Even as early as 1900 commercial possibilities were first envisioned. But a host of baffling production problems discouraged any commercial development. The real pinch felt by the Germans for rubber in World War I encouraged them to undertake postwar synthetic rubber research. Styrene was found to be of value in synthetic rubber. The Germans also made polystyrene from their styrene. In the late 20's and early 30's samples of this early crude product reached the United States. Yellow color, brittleness, and crazing were its chief drawbacks. One U. S. company undertook small-scale production, but, because of the headaches involved, soon gave it up as a bad job.

In the meantime Dow had undertaken extensive research on styrene and polystyrene. After about a decade's work styrene was introduced commercially in 1937. Polystyrene followed shortly. Production was relatively small, but the processes were sound. Thus with the outbreak of war and the nation's natural rubber supply cut off, Dow was able to respond to the government's call for help on the synthetic rubber program. The company agreed to build and operate styrene plants in California, Texas, Indiana, and Ontario, as well as to supply information on the process to other chemical manufacturers who were also asked to build styrene plants. The project was extremely successful. Production was ahead of schedule and in even greater capacity than designs called for.

The increased production of pure styrene during the war years is shown in Figure 1. Low-cost polystyrene needed inexpensive styrene. This program made it available. It remained for the material manufacturers to build, at considerable cost, polymerizing plants to convert a large portion of the available styrene to polystyrene. This venture did involve an element of risk, but enough polystyrene had been made and used prior to and during the war to indicate a much larger peacetime market.

The degree and rate of this production increase is also shown in Figure 1. In the last year about one-half of the styrene produced went to plastics and the remainder to rubber. This rate of increase of polystyrene production is much faster than that of the thermoplastics portion of the industry. In 1944 only 3.8% of the thermoplastics was polystyrene. In 1948, with polystyrene production at 150,000,000 pounds per year, its percentage of the industry (thermoplastics) amounted to 27.0 per cent. These factors permitted the necessary reduced prices for polystyrene to reach large markets. It is significant to note that even during the postwar inflationary period when living costs went up 75% and most consumer product prices went up 75-100%, the price of polystyrene increased less than 10%.

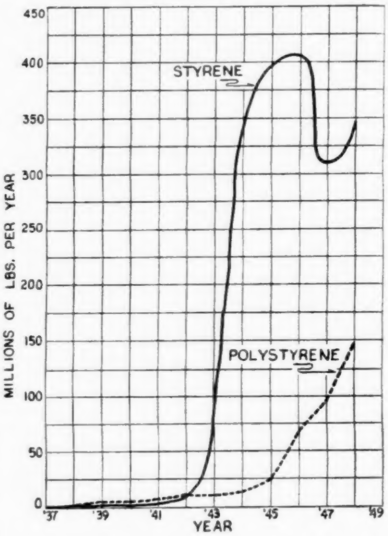

Fig. 1. Styrene and Polystyrene Production in the United States

Thus the first important goal has been largely achieved, and this low cost with polystyrene's low specific gravity means to the molder literally—"More moldings per dollar."

Reduced Crazing and Improved Quality

With the early polystyrene it was soon recognized that crazing, non-uniformity of material, and contamination were all problems that tended to limit its markets. It was found that the crazing portion of the problem could be divided into two important factors: first, the reduction of any volatile constituents that would slowly evaporate in service, leaving a cloudy, crazed surface; and, second, a reduction or elimination of strains in the finished molding.

To solve the first difficulty was the material manufacturer's problem. It meant the use of pure styrene monomer, which was by this time available from the new plants. It also meant refined polystyrene production processes that left essentially no volatile matter in the product.

The second, that of strain-free moldings, was largely a problem of the molder, although the material manufacturer became

[1] Presented before annual conference, Pacific Coast Section, Society of the Plastics Industry, Inc., Santa Barbara, Calif., Mar. 17, 1949.
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of assistance by producing more readily moldable materials. This aspect will be discussed shortly.

The overall problem of uniformity and elimination of contamination is fortunately one that can be combined with a reduction of volatile content in the polystyrene. In other words, a properly designed plant can combine both features.

Polystyrene manufacturers have not disclosed design details of their polymerization plants. The Germans, however, have done advanced work along this line, and details of their plants are a matter of public record. It is safe to assume that some of the United States plants operate in a fashion somewhat similar to the German plants and probably incorporate even more advanced designs unknown to the Germans. At least some of the methods used by the Germans could have been used to attain the improvements already available in new American polystyrene.

The two best German polystyrenes were known as Trolitul Type III and Trolitul Type IV. Styrene monomer was fed into prepolymerizing units, which consisted of jacketed kettles each of two cubic meters' capacity, and containing internal heating coils. At the start valves at the bottom were closed and heat was applied (80° C.) to start polymerization. When this polymerization was some 30 to 35% complete, the bottom valves were opened, and thick, viscous, partially polymerized material was allowed to flow out at the rate of about 100 pounds an hour. This material was flowed into a polymerizing tower which consisted of six separate sections each jacketed with internal coils. Total tower height was approximately 20 feet, and its inside diameter was about 30 inches. Heat was applied to the jackets and the coils at a temperature of 100 to 110° C. at the top, increasing to 180° at the bottom. The prepolymerized styrene was allowed to flow slowly down through the tower, polymerizing further as it went. The high final temperatures were used to polymerize the product as completely as possible and thus minimize the amount of volatile contained in the finished plastic. The product was extruded out the bottom, cooled on a belt, and ground into molding granules.

The relatively low volatile of the finished plastic meant a reduction in crazing. The fact that the process was all closed and essentially continuous meant a reduction in contamination and a uniformity of material from one production period to the next. This process, however, did not completely remove all of the volatile, and under some circumstances, particularly when the molding was highly strained, would excessive crazing still be obtained.

Type IV polystyrene was an attempt to improve general physical properties and reduce any tendency to craze even further. In this process, material at 100 pounds per hour coming from the prepolymerizer was fed directly into the vacuum chamber of a volatile remover unit. In this case the viscous material was allowed to fall and collect in the nip between two 20-inch diameter stainless steel rolls, closely spaced and operating at a temperature of 200° C. The roll speed was low, only 2½ r.p.m., and a thin sheet of the plastic material was carried around each roll. The high temperature involved and the relatively high vacuum rapidly volatilized off the 66% or so of monomer. This monomer was carried out of the chamber, condensed, collected, and fed back to the prepolymerizer unit. By the time the polymerized material had completed approximately three-quarters of a revolution around the roll, the volatile had been removed. The product was then scraped from the rolls and allowed to fall through vacuum lock gates into jacketed cars where is was collected. Periodically these vacuum lock gates were closed, and the cars removed from the vacuum chamber; the material was ground and supplied as molding powder. Produced in this fashion, the volatile was even lower than in the previous system. The process was again entirely closed and continuous; thus contamination was kept to an absolute minimum, and uniformity was very good.

The modern American production processes no doubt do all that the German process did and even more and have thus largely solved the question of crazing and uniformity.

Contamination in a plastic material such as polystyrene must be kept extremely low. The rigid requirements of cleanliness are becoming increasingly severe as the fabricators go to larger and larger moldings. The problem of cleanliness around a polystyrene manufacturing plant should interest one who is not fully aware of it. Consider the porcelain white color used in a refrigerator panel. An average sized piece might weigh one pound. Far less than 1/10-gram of discoloring contamination could easily make the piece a reject. Reject percentages of over a few per cent. are intolerable. This degree of contamination purity is less than 0.025%. This product cannot be only 99 44/100% pure; is must be at least 99 98/100% free, of contamination. Here, again, developments in plant design have made possible producing sufficiently clean and pure plastic products to enable them to be made into large parts without excessive rejects.

Improved Moldability, Faster Cycles, and Better Mold Release

In the past, molding materials have been developed largely to a certain desirable set of physical properties. The mere fact that such a product is very difficult to mold was of no great concern to the material manufacturer in the early days. Soon it was realized that unless the product was readily moldable, good finished properties in the molding could not be obtained. Thus a good material must have both good physical properties and ready moldability.

Most laboratory testing of plastic materials is carried out primarily from the standpoint of obtaining optimum physical strength properties. Other properties, such as heat stability, flow, color, and clarity, are also separately determined for quality control. Such data are very necessary for the development of new plastic formulations and are also valuable for maintaining consistent quality in the product. The commercial molder, however, finds these data difficult to transpose for his use in the solution of his problem.

An attempt has been made to set up a number of tests to evaluate commercial plastic materials from a molder's viewpoint. In order to do this evaluating effectively, the conditions existing in commercial molding plants had to be duplicated as nearly as possible, and they had to be carefully controlled. Since no standard tests had been developed to measure the many factors which contribute to good moldability, tests were set up on a comparative basis. In this way the tests were run under a given set of conditions, and two or more materials were compared in respect to general molding behavior. Conditions were selected to simulate commercial practice to include procedures in which molding difficulties are most likely to occur.

Many different polystyrenes have been studied under the methods mentioned above. For purposes of comparison here, three materials have been selected:

Sample *A*—Styron 666-K27—6. Stiff flow material for general-purpose molding. This material is of early manufacture and made prior to the time that molding area diagrams were used to aid in designing the material for best moldability.

Sample *B*—Styron 666-K27—6. Medium flow material, faster flowing than Sample A, and from current production.

Sample *C*—Styron 666-K27—63. The same material as Sample *B*, specially lubricated.

For this purpose a nine-ounce modern injection molding press with suitable mold and the necessary allied equipment was available. In a typical moldability test a cardbox bottom was used. This mold had rather severe ejection characteristics and provided a piece which could be measured accurately for dimensions. The weight of the molded piece plus the runner and sprue was 56 grams in polystyrene. When used on a nine-ounce molding machine, it was well below its plasticizing capacity. Under these conditions molding temperatures were moderate, and the flow of the plastic through the heating zone was low enough to be relatively uniform through its cross-section.

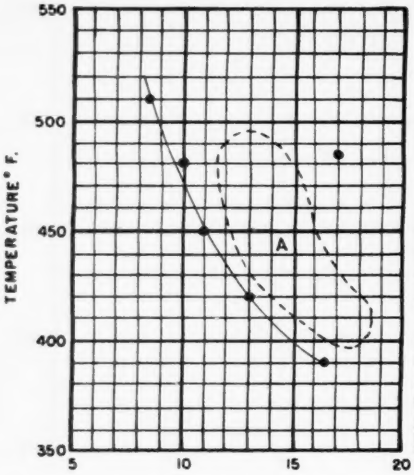
The mold was so constructed that parts from it had a long weld line subject to severe stresses during ejection. Weld lines present a serious problem to the molder both from the standpoint of obtaining good appearance and maximum strength. The mold had small draft angles and a moderate length of draw. This construction readily indicated differences in mold release characteristics. The cardbox bottom also had thin sections and sufficiently large surface areas to permit examination for clarity and surface appearances. It also had some heavy sections which provided good places for study of strain marks and bubbles.

The procedure used in molding various polymers mentioned above was first to find the minimum temperature and pressure required to "just fill the mold." It was found that this temperature-pressure relation varied in a regular manner. The line or curve established from this temperature-pressure relation is known as the "short shot line." A temperature-pressure relation was also found at which the molded part would stick in the cavity. Again a curve could be established, which was referred to as the "stick line." To simplify the charts presented with this discussion, no stick line is shown.

The area between the short shot line and the stick line was then explored over the full temperature and pressure range. Temperature and pressure conditions were maintained for a sufficient length of time to insure equilibrium at definite check points within the molding area. Sustained runs were made in which the total number of molded parts were inspected for possible flaws, and the number of rejects *vs.* good parts recorded. Other factors such as release from the mold, cracking, and clarity were also noted. During these operations a standard 35-second cycle (ram 15, clamp 15, open 5) was used. The mold temperature was kept constant at 145° F. This cycle was found to be about minimum for this particular mold.

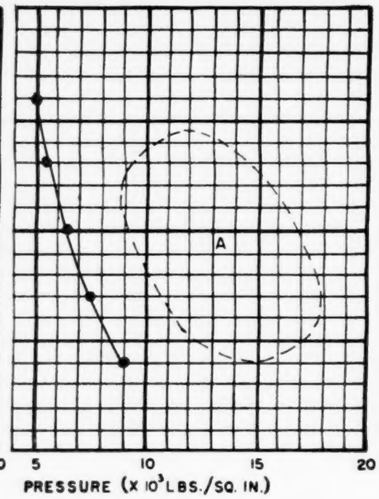
An examination of this work and the three charts (Figures 2, 3, and 4) covering the moldability of Samples *A*, *B*, and *C* lead to the following conclusions:

1. Comparison of charts on Samples *A* and *B* (Figures 2 and 3) indicates that



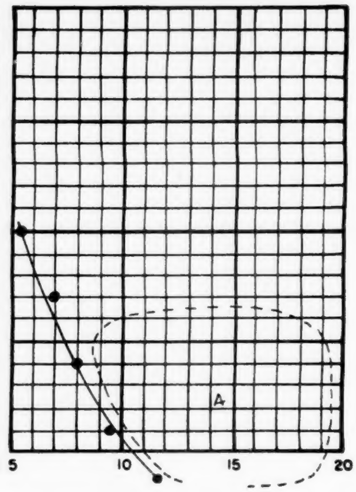
A—Good Moldings

Fig. 2. Molding Area Diagram—Older-Type Styron 666



A—Good Moldings

Fig. 3. Molding Area Diagram—Current Styron 666 Production



A—Good Moldings

Fig. 4. Molding Area Diagram—Current Lubricated Styron 666 Production

Sample *B*, the current material, has improved considerably in moldability. The short shot line has been moved down in pressure some 3,000 p.s.i. at high temperatures to 6,000 p.s.i. at lower temperatures. Molding temperatures are about the same, but the molding pressure range is greatly broadened, and the good molding area is nearly twice as large. In other words, this material would not be nearly so critical to mold as would Sample *A*.

2. Sample *C* (Figure 4) shows the effect of adding a lubricant to material *B*. In this case the short shot line is not materially changed from *B*, but the product can be molded from 50 to 100° lower in temperature than with Sample *B*. Also the area in which satisfactory moldings were obtained is even greater than with Sample *B*.

Comparative molding area diagrams have also been run on these materials in another mold. A shoe tree molding with sprue and runners weighed 160 grams and more nearly approximated the capacity of the nine-ounce injection machine mentioned above. When the shoe tree is molded on the same cycle as the cardbox, that is overall 35 seconds (15—15—5), a point on the short shot line is shown on Figure 2 of Sample *A*. This point in the upper right-hand corner of the figure is a point on the minimum temperature and pressure curve at which that mold can just be filled on this cycle. Similar points were obtained on the other materials and were about equally displaced in terms of temperature and pressure. Thus, while it is not shown, experimental work has borne out the fact that the relative pattern of molding area diagrams remains even when changing from one die to another.

In general, the results of these moldability studies have indicated them to be sufficiently reproducible so as to be used for identification tests of unknown powders. It is also possible through these studies to find differences in polystyrenes that do not show up in routine physical tests normally used. Since the latter has been found to be true, it is possible to use this method of study as a guide in production of materials to make them more suitable for the molding trade. It has also been found that the information obtained on a given machine and die can be transferred to other machine dies with reasonably good results. The difference between *well-designed dies* was not found to be so marked as was believed in the past. Such data also make possible rather specific recommendations when materials are being changed in a given machine and a given die.

The type of practical research illustrated above is only a small indication of that being undertaken by the material manufacturers at present. This work has resulted in the production of plastic materials with greatly improved moldability, which has meant in turn faster cycles in the molder's machine. This in turn, of course, means lower molding cost. The use of specially lubricated materials such as Sample *C*, has greatly improved the mold release of these products, which is needed in the molder's lowering his reject percentages.

(To be concluded)

SPE Prize Paper Contest

FOR the third consecutive year SPE is holding its Prize Paper Contest to find the three best and most original articles dealing with some aspect of the plastics industry. The 1949 contest is open to all, including non-members of the Society. The only restrictions are that the articles be less than 5,000 words exclusive of diagrams and pictures; that papers submitted must not have been previously published, first publication rights being held by SPE; and that the papers shall be submitted for judging not later than November 1, 1949. The articles may be of theoretical or practical nature and deal with any phase of the plastic industry.

Prizes in the national contest are $200, $100, and $50, with the added presentation of a certificate of award. Judging in the Society's local sections takes place first, and the local prizes are in some cases larger than the national awards. George Clark, Owens-Illinois Glass Co., is chairman of the contest, and the judges are: Robert Burns, Bell Telephone Laboratories; Howard K. Nason, Monsanto Chemical Co.; Nicholas Rakas, National Automotive Fibers, Inc.; Gerald H. Mains, National Vulcanized Fiber Co.; and J. H. DuBois, Shaw Insulator Co. All entries should be submitted to the National Office, Society of Plastics Engineers, Inc., 409 Security Bank Bldg., Athens, O., for redistribution to the proper local section. To facilitate judging, it is requested that six copies of each entry be submitted.

Newark Section Opens Fall Season

A talk on "The Fundamentals of Polystyrene Extrusion," by A. T. Look, Dow Chemical Co., featured the September 14 dinner-meeting of the Newark Section, SPE, the first meeting of the season. Approximately 100 members and guests of the Section attended the affair, held at the Newark Athletic Club.

Mr. Look emphasized that there is no such thing as a general-purpose extruder and that best results can be obtained by specifying a machine best suited for the particular application. Molding dies should be engineered to fit the operating conditions of one machine and from then on be considered a part of that machine.

The speaker expressed the belief that the best type of heating for extruders is high-pressure steam, although oil and electrically heated units are satisfactory if sufficient means are provided to dissipate frictional heat. Inasmuch as frictional heat can be developed at any spot in the cylinder barrel, zone cooling is a definite requirement in all cases.

A compressing-type screw and torpedo assembly was recommended for polystyrene extrusion. The most effective length of screw flight has been found to be 32 inches, with a 12-inch long torpedo section. The speaker concluded with some mention of the use of polystyrene in refrigerator breaker strips, lighting strips, and many new functional uses in the electrical field now being developed.

New York Section Has Business Session

The first meeting of the season of the New York Section took place on September 21 at the Hotel Shelburne, with approximately 37 members and guests attending. Instead of having the usual technical speakers, the meeting took the form of a business session at which achievements during the year were evaluated and plans formulated for further improving the activities of the Section.

The business session followed an after-dinner showing of the SPI film. "A Scien-

(Continued on page 80)

Scientific and Technical Activities

Recent Developments in Mechanical Rubber Goods

WHILE the adaptation of conveyer belts for long hauls in the transportation of materials has been going on for the past 20 years, the possibilities have been dramatically presented to the public this year by an organized project to connect a Lake Erie port with the Ohio River by a succession of long-centered conveyers over a private right of way. It is generally believed in the industry that such a project is practicable and will ultimately be a reality. Many long-centered conveyer installations are already in operation and projected on drawing boards, in some cases utilizing reinforcement members on the belt consisting of high-tension synthetic fibers and even steel cables.

While cotton is still used in greatest volume, various rayon fibers, nylon, and glass fibers are coming into increased use in certain types of V-belts as well as transmission belting, conveyer belting, and hose. There has been a decided swing toward rayon in braided hose partly due to lower cost per unit of strength. At least two manufacturers are offering steam hose reinforced with fiber glass yarn. At least one manufacturer has introduced a cotton rubber lined fire hose in 75-foot lengths, and other developments reveal the increasing demand for strength combined with lighter weight in various types of hose.

The U. S. Engineers have challenged the hose industry with a problem so far unsolved: a lightweight continuous length oil hose in large diameters, which can be compactly stored and quickly laid out to carry fuel considerable distances over the ground in combat areas.

The rubber garden hose industry has been confronted with increasing competition from extruded hose made of vinyl materials. The light weight, easy handling, and cleanliness of the plastic hose have made a definite appeal to the public.

Oil-resisting synthetic rubbers, which have found their greatest use in the mechanical rubber goods industry, have been extended into several new uses, including high-pressure spray hose for handling weed killer chemicals destructive to natural rubber. High-pressure hose has been found useful as a flexible connection in apparatus for fertilizing with liquid ammonia.

One interesting development has been the adaptation of reinforced diaphragms joined by pressure-sealing zippers connecting the car units in the Spanish Talgo train.

"Cold rubber" is beginning to find limited uses in the mechanical rubber goods field. Its abrasion-resisting properties offer interesting possibilities, and many manufacturers are cautiously experimenting with it in conveyer belt covers and types of hose which have to contend with severe abrasion. Some manufacturers believe, however, that several shortcomings in "cold rubber" must be overcome before it comes into general use in the mechanical goods field.

The publication in July of the 1947 Census of Manufacturers reveals much interesting information applying to production in a postwar year when all manufacturing facilities were taxed to the utmost in filling a pent-up demand. The aggregate value of the production of mechanical rubber goods in that year was $621,703,000, an increase of 250% over the value of mechanical rubber goods produced in 1939. Although average price levels were not more than 50 to 60% higher, the tonnage production averaged more than double that for the year 1939.

Atlantic City Rubber Division, A. C. S., Meeting

THE fifty-fifth meeting of the Division of Rubber Chemistry, American Chemical Society, held as a part of the meeting of the parent Society in Atlantic City, N. J., September 21 through 23, attracted an attendance of about six hundred members and guests. Although this attendance was somewhat less than usual, much interest was evidenced in the technical part of the program, the 25-Year Club luncheon, the Division banquet, and the affairs of the Division discussed at the business meeting.

One of the highlights of the meeting was the announcement at the banquet on the evening of September 22 of the selection of C. C. Davis, Boston Woven Hose & Rubber Co. and editor of the Division's publication, *Rubber Chemistry and Technology*, to receive the Charles Goodyear Medal in 1950. The approval of the members of the Division of this choice by the Charles Goodyear Medal Award committee headed by H. E. Outcault, St. Joseph Lead Co., seemed unanimous.

F. W. Stavely

The 25-Year Club Luncheon

The luncheon-meeting of the 25-Year Club, presided over by John Coe, Naugatuck Chemical Division, United States Rubber Co., was held on September 21 with 90 members present. Mr. Coe announced that membership of the 25-Year Club now totaled 300 and urged that both new and old members fill out the cards sent them in order that the affiliations and years of service in the industry and other necessary information be complete and up-to-date.

C. R. Haynes, of Binney & Smith Co. and secretary of the Division, was honored as the member present with the longest period of service in the industry (1904), as was Bancroft Henderson, American Cyanamid Co., (1906), and other old-timers who entered the industry through the year 1910.

New members of the Club introduced at the luncheon (Class of 1924) were G. S. Haslam, New Jersey Zinc Co.; C. E. Carlson, General Tire & Rubber Co.; S. H. Tinsley and G. C. Maasen, both of R. T. Vanderbilt Co.

Mr. Coe announced that E. J. Kvet, Baldwin Rubber Co., had been selected as chairman for the next 25-Year Club luncheon in Detroit, Mich., at the April, 1950, meeting of the Division.

The Technical Sessions

H. I. Cramer, chairman of the Division, in his opening remarks at the first technical session on the afternoon of September 21 mentioned that the response to the request for papers at the Atlantic City meeting had been poor, and as a result for some time there had been doubt whether the meeting could be held. He asked that the members begin at once considering papers for the spring meeting of the Division in Detroit and the fall meeting in Cleveland, O.; this latter meeting is of particular importance because of its international aspect.

Abstracts of the papers presented at the technical sessions were published in our September issue, pages 710-716. Further mention is required, however, of the paper by W. P. Fletcher, British Rubber Producers' Research Association, in which some of the problems involved in the grading and testing of natural rubber were discussed. This paper was followed by a lively discussion period in which the variability of compounding ingredients was also mentioned by a representative of the Office of Rubber Reserve.

M. H. Whitlock, ORR, announced that beginning October 1, shipments of GR-S would be accompanied by strain test data in addition to the regular modulus at fixed elongation data. The strain test data are obtained with the instrument developed by the National Bureau of Standards, and this instrument was described in India RUBBER WORLD in June and July, 1948. It was requested that users supply ORR with their comments on the value of these strain test data with a view to the elimination of the modulus data and the use of the strain test data only.

The paper by M. J. Brock, of Firestone Tire & Rubber Co., on the application of microradiography to rubber compounding problems indicated the value of this technique in determining the degree of dispersion of various pigments in elastomers. Evidence of the influence of aggregated zinc oxide and carbon black "grit" particles on flex cracking was shown.

The compounding research study by L.

R. Sperberg, Phillips Chemical Co., on the effects of sulfur and accelerator variations upon the physical properties of a "cold rubber" tread stock, in which the data were presented in the form of three-dimensional graphs (isopleths), was well received.

Considerable interest was also evidenced in the paper by R. E. Shrader and W. N. Keen, E. I. du Pont de Nemours & Co., Inc., on the importance of controlling heat losses in molding operations. Insulation of the press platens and the hot mold from the apron or bench was shown to improve greatly the speed of cure and uniformity of the vulcanized stock.

G. S. Whitby, University of Akron, preceded the presentation of his "invited" paper on polyamine-activated polymerizations with a review of advances in all fields of synthetic rubber in the last 30 years. In connection with his paper, Dr. Whitby also demonstrated the very rapid decomposition of hydroperoxides by certain polyamines and the emulsion polymerization of butadiene with the polyamine-activated recipe, by which 40% conversion was obtained in four to five minutes.

A. A. Morton, Massachusetts Institute of Technology, in another "invited" paper, discussed the alfin catalysts for polymerizating butadiene. Vulcanized stocks with a tensile strength of 4,500 p.s.i. and a minimum elongation of 450% were reported. This speaker also demonstrated the very rapid polymerization of butadiene in pentane by the alfin catalysts.

The paper by D. B. Forman, L. R. Mayo, and R. R. Radcliff, all of du Pont, on the vulcanization of Type W neoprene, was followed by an extended discussion period in which many of the properties of this new neoprene polymer were reviewed.

The Business Meeting

At the business meeting the morning of September 23, Dr. Cramer first announced the passing of three members of the Division during the last year and then asked the members present to stand for one minute of silent tribute. These three members were A. D. Cummings, Collyer Insulated Wire Co.; C. E. Linscott, U. S. Rubber; and L. D. Ackerman, Converse Rubber Co.

Emil Krismann, du Pont, chairman of the auditing committee, next made his report.

A. E. Drake, Hercules Powder Co., chairman of the membership committee, reported that the membership of the Divison now totaled 2121 and that 171 new members had been added during the past year.

R. G. Seaman, India RUBBER WORLD, chairman of the tellers' committee, reported on the letter balloting for officers and directors of the Division. Officers for the coming year are: chairman, F. W. Stavely, Firestone; vice chairman, J. H. Fielding, Armstrong Rubber Co.; secretary, Mr. Haynes; treasurer, C. W. Christensen, Monsanto Chemical Co.; directors, Dr. Cramer and S. G. Byam, of du Pont.

Directors elected from the areas of the sponsored local rubber groups follow: Akron, A. E. Juve, B. F. Goodrich Research Center; Boston, F. H. Amon, Godfrey L. Cabot, Inc.; Buffalo, A. H. Davis, Dunlop Tire & Rubber Corp.; Chicago, P. F. Niessen, Victor Mfg. & Gasket Co.; Connecticut, C. M. Doede, Connecticut Hard Rubber Co.; Detroit, G. F. Lindner, Minnesota Mining & Mfg. Co.; Los Angeles, R. E. Hutchinson, Firestone; New York, D. E. Jones, American Hard Rubber Co.; Northern California, A. E. Barrett, Mare Island Naval Shipyard; Philadelphia, L. K. Youse, L. H. Gilmer Division, U. S. Rubber; Rhode Island, F. H. Springer, Davol Rubber Co.; and Southern Ohio, J. E. Feldman, Inland Mfg. Division, General Motors Corp.

J. H. Fielding

Dr. Cramer then announced that the local rubber group in Washington, D. C., had been accepted by the Division as a sponsored local group.

It was stated that certain revisions in the by-laws of the Division will be submitted to the membership in the near future.

A new directory of the Division will be mailed within the next two or three weeks, and the 1944 and 1945 Rubber Bibliography will appear during the first half of 1950.

Dr. Stavely, the new chairman, was then welcomed by Dr. Cramer, and Dr. Stavely reported on the plans for the meetings in 1950. The spring meeting will be held in Detroit, Mich., April 19-21, as one of the divided meetings of the Society. The headquarters will be the Book-Cadillac Hotel.

The fall meeting will be held in Cleveland the week of October 8, and this meeting will be separate from that of the parent Society and will also be in the form of an international rubber technology conference. Letters have been written to about 20 overseas rubber companies and organizations, and the replies received indicate that most of these organizations will attend the Cleveland meeting, Dr. Stavely said. He added that there was a problem of finances for the overseas guests and assured the members that the Division will work out means of supplementing the funds of these guests.

It was also announced that the ASTM D-11 Rubber Committee planned to hold an international standards conference either immediately preceding or following the Division meeting, also in Cleveland.

The business meeting was concluded with a plea for papers for the 1950 meetings, particularly for the international meeting in the fall.

The Division Banquet

The banquet of the Division, held the evening of September 22, was featured by the presence of Linus Pauling, California Institute of Technology, president of the Society; Alden Emery, business manager; Walter J. Murphy, editor of *Industrial and Engineering Chemistry* and *Chemical and Engineering News*, and Mr. Fletcher, of the BRPRA. Dr. Pauling spoke briefly in appreciation of the work of members of the Rubber Division with special reference to the development and commercial production of synthetic rubber.

Dr. Cramer thanked L. K. Youse, chairman of the arrangements committee, for the work of his committee in handling all the many details of the Atlantic City meeting.

As mentioned previously, it was also announced at the banquet that C. C. Davis had been selected to receive the Charles Goodyear Medal in 1950.

There was no formal speech-making, and the members and their guests were entertained by several excellent vaudeville acts to conclude the evening.

Sequel to the Boston Clambake

SOME 500 or more persons who attended the ill-fated clambake arranged by the local committee for the May meeting of the Division of Rubber Chemistry, A. C. S., were pleasantly surprised early in September when they received packages containing the ingredients for their own private clambake, this time all *well-cooked*.

These were sent by George Smith, E. I. du Pont de Nemours & Co., Inc., chairman of the clambake committee, and J. C. Walton, Boston Woven Hose & Rubber Co., general chairman for the May meeting. It is apparent that Messrs. Smith and Walton finally succeeded in making a satisfactory financial adjustment with the alleged "bakemaster" of last May so that the distribution of these packages could be possible.

We hope the members and guests of the Rubber Division who attended the clambake in May will be properly appreciative of the perseverance and effort of these two local committee members in making this adjustment possible.

Consulting Chemists Meet

IN RESPONSE to repeated public demand, the Association of Consulting Chemists & Chemical Engineers, Inc., has adopted a new policy of "open door meetings." Representatives of industry and nonmember professional men will be welcome at the Association's twenty-second annual dinner meeting on October 25 at the Hotel Shelburne, New York, N. Y. Guest speaker will be Robert A. Whitney, president of the National Federation of Sales Executives, who will discuss "Better Selling—The Catalyst of Our Economy." Since accommodations are limited, reservations for the meeting must be made at the Association's office, 50 E. 41st St., New York 17, N. Y., before October 21.

Philadelphia Group Outing

APPROXIMATELY 135 members and guests of the Philadelphia Rubber Group attended the annual outing on September 9 at the Cedarbrook Country Club. Splendid weather, food, companionship, and prizes made the outing one of the most successful in the Group's history. The affair featured an afternoon golf tournament followed by a dinner in the evening and the distribution of door and tournament prizes. Awards in the golf tournament went to F. F. Salamon, Binney & Smith Co., for low score of 78, and to Robert J. Rhoads, L. H. Gilmer Division, United States Rubber Co., for his low medal handicap score of 70.

Los Angeles Group Outing

THE annual summer outing of the Los Angeles Rubber Group, Inc., took place on July 23 and 24 at Catalina Island, as in previous years. Some 116 members and guests of the Group attended, leaving Wilmington, Calif. Saturday morning and returning early Sunday evening. Activities commenced immediately upon departure from the mainland, with the holding of a Calcutta auction and participation in various shipboard games.

Arriving at Catalina, the group was served luncheon at the Country Club and the afternoon was then given over to golf, tennis, and darts tournaments. Dinner at the Club was followed by an evening of dancing, cards, dominoes, and other activities, including elbow bending, guessing contest, and a "dice horse race." Instead of the usual fishing trip Sunday morning, the annual softball game between the "Suppliers" and "Users" was held. Despite their own efforts and the undoubtedly inimitable umpiring of Del Schade, Ohio Rubber Co. of California, the "Users" finally triumphed by the score of 13-7. The quality of softball play precipitated an egg throwing free-for-all, but the melee ended in time to permit the running off of other athletic contests, including horseshoe pitching, football kick, and others.

Sunday dinner preceded distribution of prizes to contest and tournament winners, and the drawing for door prizes. Prize winners in the golf tournament were: blind bogey, Art Phelan, Atlas Sponge Rubber Co.; low net, J. R. Morath, Naugatuck Chemical Division, United States Rubber Co.; high gross, George Gregory, Products Research Co.; low gross, A. L. Pickard, Braum Corp.; second low gross, Bill Michalak, Plastic & Rubber Products Co.; high score on blind hole, F. C. Johnston, Caram Mfg. Co.; longest drive, W. A. Fairclough, Enjay Co.; least putts, C. M. Reinke, Reinke & Amende, Inc.; longest putt, Mr. Findlay, Shell Oil Co.; and most times in sand traps, D. C. Maddy, Harwick Standard Chemical Co.

Winners of prizes in the other athletic contests follow: tennis doubles, Phil Drew, Goodyear Tire & Rubber Co., and W. E. Shawger, California Rubber Products Co., with second prize going to J. A. Knudson, Kirkhill Rubber Co., and Clint Booth, Glenn H. Taylor Co.; horseshoes, Mr. Michalak, G. H. Goes, Kirkhill, and C. R. Wolter, Witco Chemical Co.; darts, Ted Dabovich, Sharples Chemicals, Inc., W. R. Westman, Atlas Sponge Rubber, and Carl Hoglund, Goodyear; egg throwing, A. H. Subrin, H. Muehlstein & Co., Inc., and J. M. Butler, Fullerton Mfg. Co., with second prize going to F. M. Francis, A. Schulman, Inc., and W. R. Snyder, R. T. Vanderbilt Co., Inc.; football kick, Hal Crosky, guest, W. E. Boswell, Thiokol Corp., and D. Stillman, Plastic & Rubber; and football pass, Mr. Johnston, Mr. Schade, and L. C. Boller, Technical Coatings, Inc.

Besides contest winners, others present at the outing were awarded door prizes at the drawings. The grand prize, a television set, was won by H. K. Patch, Crossfield Products Corp.; while the contest to guess the number of ball bearings in a coke bottle was won by A. J. Hawkins, Jr., E. I. du Pont de Nemours & Co., Inc.

Much of the credit for the success of the outing must be given to General Program Chairman E. C. McLaughlin, H. M. Royal, Inc., and to his committee consisting of Mr. Hoglund, transportation, housing, and reception; A. H. Federico, C. P. Hall Co. of California, golf; B. E. Biheller, H. Muehlstein, other sports; F. A. Thistle, Typrene Roller Co., prizes; Tway Andrews, H. M. Royal, ticket sales; Mr. Maddy, raffle; W. H. Del Mar, Adamson United Co., entertainment; and R. D. Abbott, consultant, publicity.

Wing-Stay S, New Antioxidant

WING-STAY S, the first in a new series of rubber chemicals, has been announced by the chemical division, Goodyear Tire & Rubber Co., Akron 16, O. The new product is said to be an excellent antioxidant possessing superior non-staining and non-discoloring properities, especially suitable for light-colored rubber stocks. Now available in production quantities, the new material may be used in both natural and synthetic rubbers and latices.

Wing-Stay S is an amber-colored liquid consisting of a blend of substituted phenols. It has a density of 1.08 gm./ml. or 9.0 lbs./gal.; a viscosity of 20-40 secs. in a #4 Ford cup; and a refractive index of 1.598-1.600. It is quite stable to heat, with no evidence of decomposition at 260° C. The material exhibits a comparative low volatility, only 3.2% by weight evaporating from a sample in an open container placed in an air oven at 95° C. for four hours. The new antioxidant, it is further claimed, will not hydrolyze; is practically insoluble in water; partially soluble in aqueous alkaline solutions; and completely soluble in most common organic solvents.

The heat stability and low volatility of Wing-Stay S permit its complete incorporation in rubber stocks with minimum loss by volatilization and no loss in effectiveness. The low volatility also insures mores permanent protection to the rubber; makes the ordinarily mild odor of Wing-Stay S imperceptible in the finished compound; and minimizes the possibility of contamination of other materials used with the rubber which might otherwise be affected by a more volatile antioxidant. Being a liquid, the new material is capable of being rapidly and uniformly dispersed in both solid and liquid compounds.

Comparative tests with other antioxidants have shown Wing-Stay S to possess non-discoloring characteristics at least equal to those previously considered to be the best available in this respect. The properties of the new antioxidant also suggest its use in paints, wax emulsions, resins, polymer solutions, and polymer-wax combinations.

Chemical Industries Exposition

A WIDELY assorted array of new chemical products and processing machinery will be displayed at the Twenty-Second Exposition of Chemical Industries, to be held in Grand Central Palace, New York, N. Y., on November 20 to December 3. Although the results of recent research will account for a number of these innovations, the majority are products of development work extending through the years in many widely separated fields.

In the field of new chemicals, one manufacturer will display a new organic water soluble ion exchanger, expected to find uses in many industries, including "cold rubber" polymerization. Another exhibitor will offer a line of 25 items consisting of hot melt concentrates of Butyl rubber and polyethylene for improving the properties of waxes, vinyl printing inks, vinyl and laminating adhesives, latex plush backing, organosol coatings, and other polymer emulsions, dispersions, and solutions.

In the instrument field, improvements in the mass spectrometer have extended its range to samples containing water and alcohols, as well as mixtures of chemical solvents, organic intermediates, and derivatives. The first complete electrophoresis laboratory completely contained in one compact cabinet will also be shown for the first time, along with a new cycling temperature-humidity cabinet.

New chemical machinery will constitute the principal attraction at the Exposition. Among the exhibits will be a disintegrator for size reductions in wet and dry applications, with a screw-feed unit for precooling or preheating the material, and a new feed control unit; a new line of centrifugal pumps made of a plastic material; a new self-cleaning pressure leaf filter; a new agitator separator feeder for a magnetic separator; and a new "ferrous filter" for removing fine iron from liquids.

The Exposition is under the management of the International Exposition Co., with Charles F. Roth as manager, and E. K. Stevens as associate manager.

New Good-rite Chemicals

THE availability in experimental quantities of two Good-rite chemicals, not previously disclosed in the literature, has been announced by B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, O. The first chemical is n-hydroxyethyl-beta-alanine, a product distinguished by three chemically active groups and useful as a chemical intermediate for organic synthesis. It is furnished as a light-buff-colored crystalline solid, miscible with water, soluble in acids and alkalies, slightly soluble in alcohol, and insoluble in benzene and chlorinated hydrocarbons. It has a molecular weight of 133 and a melting point of 143-145° C.

The second chemical is n-dodecyl-beta-alanine, of special interest as an emulsifier, wetting agent, and detergent for the pharmaceutical, soap, and cosmetic industries. It is reactive with both inorganic acids and bases, furnishing corresponding salts that notably decrease the surface tension of water. Furnished as a white, waxy crystalline solid, this chemical has a molecular weight of 275 and melting point of 55-60° C. It is insoluble in water, but is soluble in sodium hydroxide solutions, alcohols, chlorinated hydrocarbons, and benzene.

Textile Microscopy Session

A TECHNICAL papers session on "Modern Techniques in Microscopy and their Application in Textile Research" was held by ASTM Committee D-13 on Textile materials on October 20 at the Benjamin Franklin Hotel, Philadelphia, Pa. The session comprised three papers, given by prominent scientists in simple language understandable to persons not directly engaged in the field of microscopy. The meeting was opened to non-members of the Society, and question and answer periods were held after each paper.

The papers presented were: "A New Technique for Making Very Thin Clear Sections and Its Application in Electron Microscopy," S. B. Newman, National Bureau of Standards; "Some Applications

of Modern Microscopy to the Study of Fibers and Thin Films," F. F. Morehead, American Viscose Corp.; and "Some Applications of Modern Microscopy to the Study of Chemical Phenomena and in the Dyeing and Printing of Textiles," G. L. Royer, American Cyanamid Co.

CALENDAR

- **Oct. 17-18.** ASTM Committee D-14 on Adhesives. Fall Meeting. 1916 Race St., Philadelphia, Pa.
- **Oct. 19.** South Texas Section, SPE.
- **Oct. 19.** New York and Newark Sections, SPE. Joint Meeting. Hotel Shelburne, New York, N. Y.
- **Oct. 20.** Quebec Rubber & Plastics Group. Canadian Legion Hall, Montreal, P.Q., Canada.
- **Oct. 21.** New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
- **Oct. 21.** Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne, Ind.
- **Oct. 24-28.** National Safety Council. Thirty-Seventh National Safety Congress and Exposition. Chicago, Ill.
- **Oct. 25.** Washington Rubber Group.
- **Oct. 27.** Southern Ohio Rubber Group.
- **Oct. 28.** Akron Rubber Group. Fall Meeting. Mayflower Hotel, Akron, O.
- **Nov. 1-5.** Pacific Chemical Exposition & Conference. San Francisco Civic Auditorium, San Francisco, Calif.
- **Nov. 4.** Northern California Rubber Group. Hotel Whilcomb, San Francisco.
- **Nov. 9.** Newark Section, SPE.
- **Nov. 14.** Upper Midwest Section, SPE.
- **Nov. 16.** New York Section, SPE. Hotel Shelburne, New York, N. Y.
- **Nov. 16.** South Texas Section, SPE.
- **Nov. 17.** Rhode Island Rubber Club. Fall Meeting.
- **Nov. 17.** Northern California Rubber Group.
- **Nov. 17-19.** ASTM Committee D-9 on Electrical Insulating Materials. Atlantic City, N. J.
- **Nov. 18.** Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne, Ind.
- **Nov. 22.** Washington Rubber Group.
- **Nov. 24.** Quebec Rubber & Plastics Group. Canadian Legion Hall, Montreal, P.Q., Canada.
- **Nov. 27-Dec. 2.** ASME. Annual Meeting. New York, N. Y.
- **Nov. 28-Dec. 3.** Twenty-Second Exposition of Chemical Industries, Grand Central Palace, New York, N. Y.
- **Dec. 4-7.** American Institute of Chemical Engineers. Annual Meeting. William Penn Hotel, Pittsburgh, Pa.
- **Dec. 9.** Detroit Rubber & Plastics Group. Christmas Party. Detroit-Leland Hotel, Detroit, Mich.
- **Dec. 9.** The Los Angeles Rubber Group, Inc. Christmas Party.
- **Dec. 10.** Southern Ohio Rubber Group. Christmas Party. Miami Valley Golf Club, Dayton, O.
- **Dec. 12.** Upper Midwest Section, SPE.
- **Dec. 13.** Buffalo Rubber Group. Christmas Party. Hotel Westbrook, Buffalo, N. Y.
- **Dec. 14.** Newark Section, SPE.
- **Dec. 14.** South Texas Section, SPE. Annual Business Meeting.
- **Dec. 16.** New York Rubber Group. Christmas Party. Henry Hudson Hotel, New York, N. Y.
- **Dec. 16.** Boston Rubber Group. Christmas Party. Somerset Hotel, Boston, Mass.

New York Section

(*Continued from page* 74)

tific Approach to Better Plastics," illustrating the basic work in plastics research being performed at Massachusetts Institute of Technology. The session began with reports from Secretary-Treasurer George Baron, Ideal Plastics Co.; House Committee Chairman Bruno Wessinger, Wess Plastic Molds, Inc.; and Program Committee Chairman G. Palmer Humphrey, G. P. Humphrey Plastics. Section President Stanley Bindman, Noma Electric Corp., reported that the 1951 SPE national conference will be held in New York, N. Y., and will be sponsored jointly by the Newark and New York sections.

Some of the problems discussed in the open meeting were the establishment of a committee of experts to answer members' questions on practical difficulties encountered with machinery, molds, and materials; the establishment of an employment clearing house for members; more active group participation in the selection of future technical programs; and methods of increasing membership in the group. Points brought out in the discussion were noted for further study at the next meeting of the Section directors.

Plastics Exposition

THE drive to set new records for number of exhibitors and general attendance at the 1950 National Plastics Exposition began officially early in September with the mailing of promotional literature to potential exhibitors. Arrangements for the Exposition, to be held March 28 to 31 at the Navy Pier, Chicago, Ill., are being made by the Society of the Plastics Industry exposition committee, headed by Dale Amos, general manager of Amos Molded Plastics Co. The mailing included a prospectus giving details about the Exposition and available exhibit space and an exhibit space preference sheet. The drawing for assignment of all exhibit space was scheduled for October 4 at the Hotel Commodore, New York, N. Y.

Pacific Coast Conference

Initial plans are already being made for the 1950 spring conference of the Pacific Coast Section, SPI, according to Herbert G. Pratt, American Cyanamid Co., Section chairman. The conference scheduled for March 2 to 4 will be held in the Hotel Del Coronado, near San Diego, Calif. In addition to a well-balanced program the new location for the conference will permit sightseeing excursions into nearby Mexico on the week-end following the meeting.

Raul Rodriguez, *Pacific Plastics*, is chairman of the conference, with K. R. Mergen, Crest Molded Products, Inc., and L. N. West, Wilson & Geo. Meyer & Co., as vice chairman. Other committee members are: reservations and registration, L. M. Swanson, Electrical Specialty Co., L. T. Bordner, McDonald Mfg. Co., and Irving Windman, Windman Bros., Inc.; technical speaker, William Roberts; non-technical speakers, Richard Kress, Extruders, Inc., and S. T. Dahl, American Cyanamid; publicity C. C. Zimmerman, West Coast Plastics Distributors, Inc., and Ellen Kebely, K-Plastix, Inc.; arrangements, G. E. Nichols, Bakelite Corp.; entertainment, B. H. Thompson, Molded Products Co., and Albert Greenberg; golf, C. E. Menig, and A. R. Tucker, Jr., Dow Chemical Co.; cocktail party, R. F. Bitter, B. F. Goodrich Chemical Co., and J. L. Taylor; old-timers observance, R. L. Peat, Peat Mfg. Corp. and J. D. McDonald, McDonald Mfg.; reinforced plastics, Brandt Goldsworthy, and G. R. Huisman, North American Aviation, Inc.; and *ex-officio members*, E. N. Huling Wilcox Plastics Molding Co., and A. J. Carlson, Automatic Plastic Molding Co.

Adhesives for Polyethylene

DISPERSITE 1789 and 1822-A, two new flexible adhesives for polyethylene coated surfaces, have been announced by Naugatuck Chemical Division, United States Rubber Co., Rockfeller Center, New York 20, N. Y. The new products are aqueous dispersions suitable for application by brushing, spraying, or roller coating. Dispersite 1789 dries to a gray-brown film; while Dispersite 1822-A dries to a transparent, ordorless film suggesting its use in food packaging applications.

Both adhesives are said to have a ply strength of 10 pounds a linear inch, when separated at a rate of two inches a minute. Developed for seaming bags of polyethylene or polyethylene-wax coated paper, the adhesives should also find use in other applications where a flexible type of adhesive is required. Among the outstanding properties claimed for the new adhesives are ability to bond to smooth surfaces, flexibility, water resistance, and freedom from fire hazard during handling. Modifications of these compounds for special uses are also available.

Statement of India RUBBER WORLD

Statement of the ownership, management, and circulation, required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946, (39 U. S. C. 233) of India RUBBER WORLD, published monthly at Orange, Conn., for October 1, 1948.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: publisher, Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.; editor, Robert G. Seaman, 386 Fourth Ave., New York 16, N. Y.; managing editor, S. R. Hague, 386 Fourth Ave., New York 16, N. Y.; business manager, B. Brittain Wilson, 386 Fourth Ave., New York 16, N. Y.

2. The owner is: Bill Brothers Publishing Corp., Raymond Bill, Edward Lyman Bill, Randolph Brown, all at 386 Fourth Ave., New York 16, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: None.

4. The two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

B. BRITTAIN WILSON
Business Manager

Sworn to and subscribed before me this 26th day of September, 1949.

[SEAL] HELEN M. VERLIN
Notary Public, State of New York, Residing in New York County, New York County Clerk's No. 30.
(Commission expires March 30, 1950)

RUBBER WORLD
NEWS of the MONTH

Mandatory Synthetic Rubber Consumption Reduced 50,000 Tons; Strike Threats Reduced by the Reelection of Buckmaster

The month of September, which was marked by the Tri-Partite Monetary Conference in Washington, the devaluation of the currency of the sterling bloc countries, and the announcement that an atomic explosion had taken place in Russia, in the field of world news, saw in the rubber field the reduction of mandatory consumption of synthetic rubber in the United States by 50,000 long tons a year and the widest variations in the price of natural rubber that have been experienced for some time.

Following the monetary conference and the recommendation that synthetic rubber use in the United States be reduced and natural rubber stockpiling purchases accelerated, the United States Department of Commerce announced on September 23 that mandatory consumption would be reduced by 35,000 tons of GR-S and 15,000 tons of GR-I a year. The price of natural rubber rose with the recommendation for more active stockpile buying, but dropped again when the devaluation of the pound and other sterling bloc currencies was announced.

Business in August and September was reported as considerably improved as far as most rubber companies were concerned, and backlogs of a number of classes of industrial goods showed marked increase, for the first time since last spring.

The strikes at the plants of The B. F. Goodrich Co. were still continuing as of September 27, but with the reelection of L. S. Buckmaster as president of the United Rubber Workers union at their convention in Toronto, Ont., Canada, during the week of September 19, the prospects for the settlement of this strike and the avoidance of other strikes in the industry seemed more favorable.

Less Synthetic, More Natural Rubber Use Recommended

The joint communique issued by the Tri-Partite Monetary Conference on September 12 in Washington, D. C., included in Article 9 a recommendation for the reduction of the mandatory consumption of synthetic rubber in the United States and also a recommendation for increased buying of natural rubber for stockpiling. Article 9 reads as follows:

"A working group on commodity arrangements and stockpiling gave special attention to rubber and tin. The Canadian representatives stated that the Canadian Government was prepared to take steps to increase reserve stocks of tin and rubber in Canada. The United States representatives reported that the United States Government was prepared to open to natural rubber a substantial additional area of competition, including a modification of the Government order relating to the consumption of synthetic rubber. The United States would review its stockpiling program, with particular reference to rubber and tin."

On September 14 it was reported unofficially that the United States Department of Commerce was planning to cut the amount of synthetic rubber it requires tire and tube manufacturers to use by close to 100,000 tons.

The New York Journal of Commerce, on September 16, reported an interview with George Tisdale, vice president, United States Rubber Co., in which Mr. Tisdale took the position that although Great Britain may benefit on a short-term basis as a result of the sharp rise in the price of natural rubber which followed the Monetary Conference announcement, the long-range effect will serve to strengthen the position of synthetic rubber in American industry.

It was pointed out that with all rubber producing areas working at a high percentage of capacity, there is still a shortage of crude rubber, and synthetic will have to fill the gap. The American rubber industry, furthermore, is well aware that in order to protect the national safety the synthetic rubber industry must continue its operations at their present pace, he added.

Mr. Tisdale further stated that he believes the rubber industry would use the same amount of synthetic rubber with or without government fixed minimum requirement. He admitted that large-scale purchases of natural rubber from Great Britain for stockpiling could easily put the price of natural rubber well above that of synthetic. It would be indeed strange, however, for American manufacturers to pay higher prices for natural rubber when they could produce synthetic at lower cost, he concluded.

Another report by the *Journal of Commerce* on September 20 stated that the men who run the government's synthetic rubber industry do not believe that a combination of lower natural rubber prices and a sharp curtailment in the mandatory consumption of synthetic rubber will lead to a marked increase in the use of natural rubber by American tire and tube manufacturers.

The Office of Rubber Reserve has cut back its production schedule to 20,400 long tons of GR-S a month in the fourth quarter, but this cut was planned before the Monetary Conference. Production schedules for GR-S during the first part of 1949 were set at 30,000 long tons a month and at 22,000 tons a month during the third quarter when natural rubber prices dipped below the fixed price of GR-S.

Rubber Reserve officials believe that demand for synthetic will at least match the reduced production for the fourth quarter, and they do not anticipate a further cutback to result from a pending Commerce Department decision to reduce mandatory use of GR-S or eliminate it entirely.

Virtually all switching from synthetic to natural rubber by the big tire makers, to take advantage of the price differential, has already occurred in the past few months, it was added.

Mandatory Consumption Cut

It was reported from Washington on September 24 that after a day-long session on September 23 between Commerce Department officials and the industry advisory committee the total amount of synthetic rubber that tire manufacturers are required to use will be reduced, effective September 28, by 50,000 long tons.

The detailed specification changes that will appear in a revision of Allocation Order R-1 will reduce the required average use of general-purpose synthetic rubber in small truck, passenger, and implement tires from 45 to 35% and the percentage of synthetic rubber required in rear tractor tires to 75 from 80%. In addition the required usage of Butyl in medium and small-size inner tubes will be removed.

In order to allow this reduction the current government policy concerning the consumption of synthetic rubbers has been modified so that the total amount of general purpose synthetic rubber produced and used in the United States shall be 25% of the total of this type rubber and natural rubber consumed annually. The previous percentage figure was $33\frac{1}{3}$%. This decision takes into consideration both required and voluntary usage and involves a possible reduction of 35,000 long tons of GR-S. Further, the reduction in the amount of Butyl rubber that must be consumed will be no greater than that required by the Rubber Act of 1948, 15,000 long tons a year. This figure is 15,000 long tons less than is currently required.

The calculations are based on the projected consumption of natural and synthetic rubber for the calendar year 1950, estimated at 925,000 long tons.

Currency Devaluation Drops Rubber Price

On Sunday, September 18 it was announced that Great Britain had devalued the pound from \$4.03 to \$2.80 and that nine other sterling bloc currencies were also reduced in dollar value. The commodity market in New York reacted immediately, and during the next two days the price of natural rubber dropped about 2¢ a pound. A record turnover of 4,440 long tons was traded on September 19, followed by the even higher figure of 5,790 tons on September 20.

The long-term effect of the sterling bloc currency devaluation on the price of natural rubber is obscure, but future developments may result in a leveling off at a price not much different from that which existed prior to devaluation. Stockpile buying, likely to be done at a more rapid rate during the next few months, should certainly have the effect of strengthening the market price.

Industry Trends

There were definite indications that tires and tubes and other rubber products recorded a substantial recovery in sales volume during August, and, as a result, industry estimates of sales and earnings for the full year 1949 are being revised upward from expectations of mid-year.

Dollar sales for August were below those for August, 1948, largely owing to lower prices, but unit sales volume was gratifyingly higher than the July low, making August sales comparisions with last year's figure more favorable than those for July.

Even with the August recovery, however, tire manufacturers were dubious about prospects for any sharp improvement, in the final half year, in earnings comparisons with those of last year. The reasons given for conservative estimates on earnings prospects for the last half of 1949 included: (1) the full impact on profit margins of price reductions made in June to be felt in the last half; (2) uncertainties in the labor field; (3) trend toward consumer preference for the lower-priced lines, where profit margins are less favorable than on premium tires; (4) increasing competition on non-tire products, resulting in price reductions and narrower profit margins; (5) the return of prewar seasonal sales pattern, indicating that final-quarter comparisons may not be so favorable as in the seasonably more active third quarter.

Favorable factors include, however, such items as lower rubber costs, improved operating efficiency as benefits are felt from recent plant improvement outlays, continuing development of new uses for rubber products, recent recovery in sales of tires for replacement, and the record number of passenger cars, trucks, and buses in operation.

According to another report (September 12) backlogs of a number of classes of industrial rubber goods have shown marked increase, for the first time since last spring. On some items, indicative of individual companies and not the entire industry, backlogs are now estimated at six weeks, compared with no backlogs on these items two months ago. Much of the increase is due to larger stock-orders placed by industrial distributers, it was said.

Seiberling Rubber Co., whose first half of 1949 report showed a loss instead of a profit, has reduced its total employment from 1,600 at the first of the year to about 1,200 at the end of September. All employes from top management down are being urged to cut waste, eliminate unnecessary expenses and lost time, while maintaining the quality of the company's products and services. Salaried staffs have been trimmed along with production workers; departments have been consolidated and sales forces reorganized and streamlined. Stockholders also have felt the squeeze. During August the directors passed dividends on the two classes of the company's preferred stock for the first time in many years.

The company benefited, however, from the general increase in orders for passenger-car tires for the replacement market in August. J. P. Seiberling, company president, has indicated that he believes the slump in replacement tire demand has passed its halfway point and a "definite upturn" in sales for this market can be expected in 1950. Seiberling's tire sales, which represent more than 90% of its business, are made entirely in the replacement market.

The monthly report of The Rubber Manufacturers Association, Inc., revealed that manufacturers' shipments of passenger car tires during July totaled 6,795,517 units, an increase of 3% over June, when 6,598,518 tires were shipped. Production of this type-tire decreased during the month to 5,507,334 units from 6,470,724 in the previous month; while inventories of 9,335,979 were 12% less than the 10,618,442 units on June 30.

Truck and bus tire shipment decreased in July to 898,461 units from 936,721 shipped during June. Production was down about 18% to 756,342 from 921,143 units the previous month. Inventories of 2,380,776 were down 5.4% from the 2,515,374 units at the end of June.

Shipments of automotive tubes decreased 1.7% in July to 6,299,602 units, against 6,409,215 the month before. Production was down about 19% to 5,230,075 from 6,430,026 in June, and stocks were 11,364,436 units, against 12,465,760 on June 30.

This decrease in the production of tires and tubes was partially accounted for by the complete shutdown of several plants for maintenance and vacation periods, it was explained.

United States exports of rubber and rubber products in July were valued at $8,422,356, compared with $10,102,419 in June and $11,765,619 in July, 1948, the Department of Commerce reported on September 14.

July exports of reclaimed rubber, at $124,850, were the lowest of the year, but shipments of synthetic rubber were well maintained, exceeding $400,000 for the seventh time in the last eight months, according to an analysis of Census Bureau data by the Office of Domestic Commerce.

Exports of truck and bus tires, at $3,349,917, and exports of passenger-car tires, at $445,767, were at their lowest levels since November, 1948. Shipments of farm tractor and implement tires, at $453,901, were down somewhat from recent months, but exceeded shipments of passenger-car tires for the fifth successive month. Shipments of mechanical rubber goods (belting, hose, and and packing) continued to decline, falling below $1,000,000 for first time this year.

Value of exports in the first seven months of 1949 was $70,112,838, a decline of 16.4% from the $83,905,817 reported for the corresponding period of 1948.

The RMA reported on September 26 that rubber consumption increased 11.2% during August to 78,370 long tons from 70,467 in July. Consumption of natural rubber during August totaled 44,769 tons, an increase of 10.7% from the previous month when 40,458 tons were consumed. Synthetic rubber consumption increased to 33,601 tons from 30,009 tons in July, an increase of 11.8%.

During the first eight months of this year 375,912 tons of natural rubber were consumed, against 424,104 tons for the same period in 1948, a decrease of 11.4%. The total synthetic rubber consumed in the same eight-month period amounted to 282,402 tons, against 299,554 tons the year before, or a reduction of 5.7%.

World production and consumption figures, as received from the Secretariat of the Rubber Study Group in London, showed that production of natural rubber for July was 120,000 long tons, against a consumption of 107,500 long tons, but that production for the first seven months of 1949 at 817,500 long tons was running behind consumption at 840,000 tons. World synthetic rubber production for July was estimated at 37,500 long tons for comparison with consumption during the same month of 32,500 tons. Production and consumption of synthetic rubber for the first seven months of 1949 were reported as 272,500 and 270,000 tons, respectively.

Commerce Secretary's Rubber Report

The first annual report on the administration of his responsibilities under the Rubber Act of 1948 was made by Commerce Secretary Charles Sawyer on September 14.

Use of synthetic rubber by American rubber goods manufacturers in 1948 was substantially lower than in 1947, though still above statutory requirements, it was pointed out. In 1948 industry in this country consumed 442,027 long tons of synthetic rubber; the 1947 figure was 559,666 tons.

The report reviews the history of the war-born synthetic rubber industry in this country and the reasons for current legislation setting specified production and consumption minimums. It provides information on the policies and controls established by the Department of Commerce and their administration during the 12-month period ending March 31, 1949. Also included are numerous tables showing production, consumption, and stocks of all types of rubber, both during and after the war, and manufacturers production and shipments of motor vehicle tires.

Copies of the report entitled, "Rubber, First Annual Report by the Secretary of Commerce," may be obtained from the Superintendent of Documents, Washington 25, D. C., or from any field office of the U. S. Department of Commerce, at 15¢ each.

Labor Relations News

The strike at the plants of The B. F. Goodrich Co., which began on August 26, was still in effect as we went to press. Negotiations between the URWA union and the company continued in Dayton, O.

Eight major points of disagreement were reported: (1) the wage increase demand of 25¢ an hour; (2) the company-financed pension plan that would provide payments of $100 a month, exclusive of Social Security benefits; (3) improvements in the health and welfare plan of employes; (4) extension of the six-hour day to all seven Goodrich plants; (5) elimination of the company's area wage differentials; (6) the demand for a union shop (the union has only the check-off now); (7) inclusion of the local union at the Goodrich Kitchener, Ont., plant in company-wide bargaining; (8) other contract provisions covering a grievance and arbitration system, no-strike pledge, holiday and vacation pay, and a wage differential in favor of night shifts.

Developments during the course of the negotiations were a detailed report of the presently existing pension plan at the Goodrich plants by which joint contributions from the worker and the company enable the workers to build a monthly pension of $67.50 on retirement at age 65, payment by the company of insurance premiums of its striking workers in order to keep their policies in effect for September, and the company's offer to use the recommendations of the President's fact-finding board for the steel industry dispute as a basis for negotiations for the Goodrich strike.

The President's fact-finding board report for the steel industry dispute recommending no wage increases at this time and company-financed pension and insurance plans totaling up to 10¢ an hour were proposed as a basis for negotiating the Goodrich-URWA dispute by J. Ward Keener, Goodrich vice president. George Bass, president of the local union at the Akron Goodrich plant, termed the offer a "fair" one on September 16. It was reported that the Goodrich plan would provide sickness and accident benefits of $25 a week for men and $18 a week for women at a cost of $1 a month for each worker. The company's share of the cost of the improved pension plan would not exceed 10¢ an hour.

On September 26 it was reported from Akron that a settlement was near in the Goodrich strike, with four points of disagreement remaining. These included pensions and insurance, hours of work, grievance procedures and union security. (The strike eneded on Septembr 30.)

It was also reported that the URWA would resume negotiations with the Good-

year Tire & Rubber Co. in Buffalo, N. Y., on September 28. While only wages are open for discussion at this time under the terms of the Goodyear contract, it was suggested that pensions and insurance would be reviewed in line with the recommendations of the fact-finding board for the steel industry.

It is expected that with settlement reached in the Goodrich dispute, in the near future talks will be resumed between Firestone Tire & Rubber Co., United States Rubber Co., and General Tire & Rubber Co. representatives and the URWA.

Buckmaster Reelected URWA President

The convention of the United Rubber Workers of America, CIO, which began in Toronto on September 19, was highlighted by the struggle for reinstatement by L. S. Buckmaster, former president of the union, who had been ousted several months ago by the executive board, on a complaint from the president of the Pottstown, Pa., local union.

The acting president, H. R. Lloyd, in his opening address said that the union should strive toward certain objectives to better its economic and political influence. These objectives included: higher wages, a universal six-hour day, immediate elimination of area wage differentials, a stepped-up organizational drive to bring every rubber worker into the URWA, and a drive to convince the members that political action is necessary and must be intensified.

In the jockeying for position between the anti-Buckmaster and pro-Buckmaster forces at the convention the pro-Buckmaster faction won early victories, and on September 22, in connection with his appeal for reinstatement as union president, Mr. Buckmaster won this contest 840 to 740.

The names of George Bass and L. S. Buckmaster were placed before the convention as rival candidates for the union presidency for the coming year on September 22, and on September 23, Mr. Buckmaster was reelected by a vote of 867 to 727. Elected with him were Joseph Childs as vice president and Desmond Walker as secretary-treasurer. Both of these men were supporters of the new president, and it is understood that the remaining 12 members of the union's executive board are also pro-Buckmaster.

Mr. Buckmaster described the action of the union delegates in reinstating and reelecting him to the presidency not only as a "personal vindication," but as indication that the union wished to reestablish clean, constitutional government.

In his final remarks before adjournment, Mr. Buckmaster made a plea for unity within the ranks of the union.

"We have ahead of us some very troublesome problems," he said. "Economic conditions are vastly different. Some big adjustments are taking place in the whole social and economic order. This union must prepare itself to meet these problems.

"Another problem in our union has been disunity and lack of confidence in one another. Overcoming those difficulties is the most difficult problem of all.

"I think that despite the handicaps, we got some work done. I thank all of you for your confidence in my integrity and I will do all I can to deserve this confidence."

The next convention of the URWA will be held in Buffalo, N. Y.

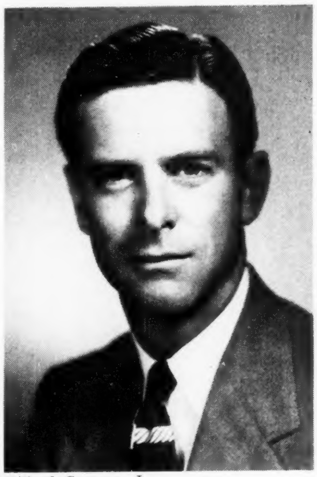
Union Accepts Pay Cut at Norwalk Tire

At the plant of the Norwalk Tire & Rubber Co., Norwalk, Conn., where 350 employes are reported to have been laid off in June after a month of negotiations, the local URWA union agreed to accept a pay cut of 11¢ an hour, on a trial basis, in order to keep the plant operating.

A spokesman for the company said it was hoped that through the temporary lowering of the wage rate the company would be enabled to regain financial stability and increase production so that a majority of the workers who were laid off could be called back within the next few weeks.

It has also been reported that the Bremen Rubber Co., a Seiberling Latex subsidiary, and the Cooper Tire & Rubber Co., had both proposed a wage cut of about 15% to their local URWA unions.

EAST



Willard Stewart, Inc.

H. Logan Lawrence

Du Pont Advances Lawrence

The rubber chemicals division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has appointed H. Logan Lawrence technical sales representative for the New England area, with headquarters in Boston. Mr. Lawrence replaces G. W. Smith, now assistant manager of the Boston office of the organic chemicals department.

Mr. Lawrence came to du Pont's engineering department in 1934, after graduation from the University of Missouri with a B.S. degree in chemical engineering. In 1936 he joined the rubber chemicals division, where he served on the rubber laboratory staff and as a sales development engineer in the main office. Then in 1946, Mr. Lawrence was placed in charge of export sales of rubber chemicals and neoprene.

The Russell Mfg. Co., Middletown, Conn., has purchased the Howard Asbestos Co., of Northfield, Vt. The name will be changed to Russell Asbestos Corp., and the firm will be operated as a wholly owned subsidiary. The purchase will insure a supply of high-quality asbestos yarns for Russell's automatic friction materials, known as Rusco brake linings and clutch facings.

Creates New Plastics Division

A new operating division to engineer, manufacture, and sell laminated plastics and insulating materials was established September 12 as the third operating unit of the chemical department of General Electric Co. This new division, to be known as the laminated and insulating products division, with headquarters in Coshocton, O., has responsibility for laminated and fabricated plastics products manufactured in Coshocton and for insulating materials produced at Schenectady, N. Y.

The new unit is being established because of the growth of the company's laminated business since the opening two years ago of the plastics plant at Coshocton where G-E laminated plastics are made for manufacturers of electrical products. Furthermore new patterns and colors recently introduced have increased the popularity of G-E Textolite plastics surfacing materials for which additional distributers are currently being appointed.

General Electric is purchasing new equipment for the Coshocton plant to take care of increased production.

With the establishment of the third operating unit a triple shift in personnel has been announced. The laminated and insulating products division will be managed by Harry K. Collins, manager of the plastics division. The latter post, with headquarters in Pittsfield, goes to Herbert B. Brusman, manager of the employe relations division. His successor is Arthur C. Treece, manager of the plastics plants at Pittsfield and Coshocton and most recently assistant to the manager of the plastics division.

Mr. Collins has announced the following staff for his division: J. J. Pyle, engineering manager; A. B. Wellborn, manufacturing manager; E. G. Gray, sales manager; and J. A. Beals, accountant. All will maintain offices in Coshocton.

Elections at Glenn L. Martin

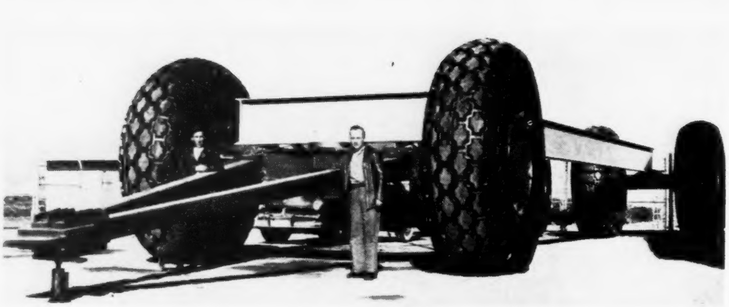
Election of three new members of The Glenn L. Martin Co.'s board was announced after its regular monthly meeting at the Martin plant in Baltimore, Md., on September 16.

The new directors are: Harvey J. Gunderson, a director of the Reconstruction Finance Corp.; Chester F. Hockley, president of Davison Chemical Corp.; and Daniel A. Evatt, vice president-finance of the Martin company.

The three new members join on the Martin directorate: Glenn L. Martin, chairman; C. C. Pearson, president and general manager; Howard Bruce, vice chairman of the board of the Baltimore National Bank; Maple T. Harl, chairman of the Federal Deposit Insurance Corp.; Everett H. Pixley, vice president of the Mellon National Bank & Trust Co.

Other principal officers of the company are: G. T. Willey, vice president-manufacturing; D. R. Shoults, vice president-engineering; Robert H. Kittner, vice president, chemicals division; Joseph C. Little, secretary; Earl R. Uhlig, controller; and William L. Lucas, treasurer.

Edgar Bros. Co., supplier of clays, Metuchen, N. J., has announced that voting control of the company has passed to its employes. Under a recapitalization plan all of the large common stockholders either sold stock to employes or exchanged it for new preferred stock.



New Giant Firestone Tires on Dolly to Carry Oil Derricks

Rubber for Arctic Use

The discovery of a synthetic rubber polymer that will bounce instead of shatter at —75° F. was announced September 25 by The Firestone Tire & Rubber Co., Akron, O. According to Raymond C. Firestone, vice president in charge of research and development, the resiliency of this new rubber may solve innumerable problems in the operation of machinery, motor vehicles, and aircraft at sub-zero Arctic temperatures. Rubber tires, hoses, gaskets, and belting in the past have frozen rock hard at temperatures below —60° F. In comparisons with GR-S and natural rubber, the new polymer has shown two outstanding advantages in tires tested under extreme sub-zero laboratory conditions; the tires do not stiffen to the point where they develop permanent flat spots when parked; and tire treads do not harden and chip out.

For the past two years members of Firestone's research staff have been conducting resiliency, elasticity, flex fatigue, and highway mileage tests on various types of Arctic rubbers for the Army Ordnance Department. Additional research and test programs are now being conducted in collaboration with the ORR. Mileage tests of tires made from the new polymer in the company's test fleet in Texas indicate that the rate of wear of these tires will be very satisfactory under normal highway driving conditions.

Giant Tires for Arabia

Dwarfing men and automobiles, huge Firestone tires will be used on dollies to carry oil derricks from finished wells to new drilling locations in the oil fields of Arabia. Shown in the accompanying photograph, each of the 36.00-40 tires, largest size ever built commercially, is 9½ feet in diameter, weighs 3,646 pounds, and can carry a load of 55,200 pounds. Instead of laboriously disassembling derricks, the Arabian-American Oil Co. in the future will lay the derricks horizontally on the axles of giant dollies for towing across the desert.

U. S. Rubber Developments

Development of a new high strength, high flexible hose for handling kerosene, fuel oil, aromatic fuels, and other petroleum distillates has been announced by United States Rubber Co., New York 20, N. Y.

The use of a braided rayon reinforcement gives a hose that combines high strength and greater flexibility with weight, allowing easier handling in fuel-oil delivery operations. Use of a nitrile rubber hose tube makes the hose practical for handling the highly aromatic fuels required in aircraft refueling service. The hose has two stranded, annealed copper wire for the dissipation of static electricity, and its cover is composed from neoprene to withstand cold temperatures, scuffing, and abrasion. Trade named the Peerless Fuel Oil-Distillate hose, the new product will be marked in sizes of one-, 1¼, and 1½-inch inside diameter and in the standard lengths used for fuel oil delivery service.

The City of New York has begun an experiment in the use of rubber pavement for its streets in a cooperative test by the Office of Manhattan Borough President and U. S. Rubber. Six stretches of street pavement were laid with a blend of asphalt and a new rubber compound. Known as Surfa-Sealz, the rubber compound was developed by the Naugatuck Chemical Division of U. S. Rubber and, according to John P. Coe, vice president and general manager, will protect the asphalt and impart improved elasticity and durability. Surfa-Sealz was specially designed to mix easily and completely with asphalt, and the the mixing can be done either on the job or in the asphalt manufacturing plant.

Nylon in combination with cotton is becoming the favored material for the construction of heavy-duty conveyer belts used in copper, iron ore, and coal ore, and coal mines, and other severe service applications. Use of this combination results in important savings in operating and maintenance costs of belts, according to Ernest G. Brown, vice president and general manager of U. S. Rubber's mechanical goods division. Nylon is used as a crosswise fiber in the belt fabric; while cotton yarn is the best textile for the longitudinal fiber, Mr. Brown said. Use of nylon in combination with cotton yarns makes possible a greater number of fabric plies, which increases the overall belt strength by as much as 250%. At the same time nylon gives a thick belt far greater flexibility, essential for efficient operation. Belts utilizing nylon fiber are now operating satisfactorily in many mines, and the number of installations is steadily increasing.

Arthur Surkamp, vice president of U. S. Rubber, will serve as chairman of the rubber division for the 1949 fund drive of the Travelers Aid Society of New York.

Erecting Research Laboratory

A modern research laboratory costing about $125,000 is being erected by United Engineering & Foundry Co. at its Canton, O., plant to further research in iron castings and rolls for the steel, non-ferrous, rubber, plastics, and paper industries. This laboratory is being named the F. C. Biggert, Jr., Research Laboratory in honor of the chairman of the board and former president of United for his continued interest in research and development.

The building, 42 feet by 110 feet, will contain all the facilities for research projects such as melting and heat treating furnaces, physical testing equipment, and a modern spectroscopic laboratory. United has also provided space for its present chemical laboratory in the new building. A library for all technical and trade journals and books pertaining to cast-iron and foundry practice will also be included.

The cornerstone for the new structure was laid September 14, with officers of the company as well as the Canton plant personnel participating in the ceremony, which was opened by Karl F. Schmidt, plant superintendent. President K. C. Gardner, introduced by Mr. Schmidt, in turn introduced Mr. Biggert, Jr., who handled the dedication and stone-laying ceremonies.

In the cornerstone were deposited copies of the first and current issues of "United Effort," the company's employe magazine; a copy of "Meet United," a booklet describing the company; a copy of the current contract between the company and Local Union #3610 of the United Steelworkers of America; a copy of the plant safety record, presented by Carl Moledore, chairman of the safety committee; and a sample of the first magnesium nodular iron made by United.

This laboratory is expected to be in full operation with a complete staff about November 1.

(*L. to R.*) John Quinn, Director and Former Manager of the United-Engineering Canton Plant, F. C. Biggert, Jr., K. C. Gardner, and K. F. Schmidt at Cornerstone Laying Ceremonies of New Branch Laboratory at Canton, O.

Introduces Trailer Tire

Cupping and irregular wear on trailer wheels and front tractor wheels of highway carriers has long been a headache to the trucking industry, with its resultant high costs and delayed service. After extensive laboratory and field tests, last spring The General Tire & Rubber Co., Akron, O., introduced its All-Rib Highway tire designed especially for front and trailer wheels. After six months of actual use on the nation's highways, proved results of the tire are given by Karl A. Dalsky, General's truck tire sales manager, as follows: (1) cornering power or the ability of the tire to lead a vehicle around a turn is increased immeasurably; (2) steering of highway carriers has been made easier without any loss of tire stability; (3) the unbroken outer ribs of the tire wear slower and more evenly than any other tire previously manufactured; (4) because of its reduced cupping tendency, the tire stays in better balance and can be kept on front wheels for many more thousands of miles after an ordinary tire would have to be shifted to a rear wheel position; (5) the easy rolling qualities of the tire give longer tire life because it tracks properly without side slippage; (6) the continuous shoulder ribs of the tire resist cupping action at all times, including the excessive cupping caused by the constant bouncing of empty trailers; and (7) because of its solid shoulder rib, the All-Rib Highway tire will recap better than previous designs.

"Give The Kids a Brake"

An appeal to all drivers in General's nationwide automobile and truck fleet for slow, careful driving as schools reopened was made by L. A. McQueen, company vice president.

"The lives of several hundred youngsters can be spared and untold injuries stopped if motorists will 'Give The Kids A Brake,'" Mr. McQueen said. "We want our test drivers, sales personnel, and truck operators across the nation to set a good example."

Mr. McQueen, a vice president of the Inter-Industry Safety Council, also proposed that America's 35,000,000 motorists give their tires a preschool-day inspection by competent tire men. Stating that "your brakes stop your wheels, but your tires stop your car," Mr. McQueen noted that there is still room for bettering the accident death record in the 5-14 pedestrian age group classification, which in 1948 was 5.5 per 100,000 population.

Campbell Names Distributers

James J. Harrison, technical director, Harry T. Campbell Son's Corp., Towson, Baltimore 4, Md., announced recently the appointment of new broker distributers for the sale of Camelwite (calcium carbonate) and Camel Carb (whiting) to the paper, wallpaper, paint, varnish, lacquer, rubber, and allied industries, as follows: Jensen & McClelland, 510 N. Dearborn St., Chicago, Ill.; Baker & Collinson, 12000 Mt. Elliott, Detroit, Mich.; Smead & Small, 1630 Hanna Bldg., Cleveland, O.; Worum Chemical Co., 2130 Kasota Ave., St. Paul, Minn.; and Pigment & Chemical Co., Ltd., Canada Cement Bldg., Montreal, P.Q., Canada.

Harry Hoehler, of Wayne, Pa., continues as the Campbell company's eastern representative.

Leland E. Spencer

L. E. Spencer Promoted

Leland E. Spencer, recently returned from Germany where he held the position of Chief of Commerce and Industry in the United States and British zones, has been appointed vice president of The Kelly-Springfield Tire Co., Cumberland, Md., it was announced by President Edmund S. Burke.

Mr. Spencer was manager of Goodyear Tire & Rubber Co.'s Topeka, Kan., factory in 1947, when the company loaned him to the War Department for a year on a leave of absence basis to assist General Lucius D. Clay in resurrecting the shattered remains of German economy. After the 12 months were up, General Clay pleaded with him to stay, but Mr. Spencer wanted to return to America. P. W. Litchfield, Goodyear chairman, made a trip to Germany at the request of General Clay and talked to Mr. Spencer, who agreed to another year.

Mr. Spencer, a member of the Goodyear organization for the past 23 years, started with the company in its Akron plant, serving in production control, statistics and forecasting departments until 1939, when he was made manager of merchandise planning. He was appointed manager of the Topeka plant in 1945, following a three-year tour of duty during the war with the government in Washington, which included the post of Deputy Director of the Rubber Division of the War Production Board.

Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, O., has announced that its general-purpose dense precipitated calcuim carbonated, marketed for several years under the trade name, Swansdown Brand, will now be sold under a new name, Non-Fer-Al Brand. In announcing this change, C. S. Hancock, manager of calcium carbonate sales, said the new name describes more accurately the low iron and aluminum content of the company's product. Diamond Alkali has been one of the nation's principal producers of precipitated calcium carbonates since 1925. Made at the company's Painesville, O., plant by a special process, the materials find widest usage in rubber compounding and in the manufacture of high-quality glass and optical ware.

Observing Centennial

Hoggson & Pettis Mfg. Co., 141S Brewery St., New Haven 7, Conn., was the subject of a feature article in the August 21 issue of the *New Haven Register*. Now celebrating its one-hundredth anniversary, the company was founded in 1849 by Samuel J. Hoggson, who manufactured molds, dies, and special tools for the rubber industry. In addition to his regular work, Hoggson also made many discoveries, including the process of roll engraving on rubber. George C. Pettis became a partner in 1879, and the company was incorporated under its present name in 1882. The firm has grown steadily, and, while rubber molds and dies continue to be the main products, scores of other articles have been made. According to Board Chairman Harry B. Kennedy, now in his sixty-third year with the company, past products have included organ stops, globes, typewriters, envelope sealers, bicycles, wrenches, lathe chucks, conductors' ticket punches, and many others. The company is proud of its tradition of having employes remain with the company all their lives; 30 present employes have been with the firm from 25 to more than 60 years. George P. Stephan, Jr., president, and Carl A. Stephan, secretary and treasurer, are sons of the late George P. Stephan, who began as an apprentice to Hoggson and latter became company president.

Goodyear Expanding Operations

An expansion program to increase production by 50% of its present capacity at the chemical division of The Goodyear Tire & Rubber Co. is well under way in Akron. According to H. R. Thies, division manager, buildings and equipment installations are expected to be completed by November 1, with production in gear well before the first of the year. The new facilities answer demands made on the division for various types of synthetic rubbers, copolymer resins, and synthetic rubber and resin latices.

Goodyear recently reached a new production milestone with the completion of its 475,000,000 pneumatic motor vehicle tire. The record-breaking production figure was reached with one of the company's popular Studded Sure Grips, designed for use in mud and snow. The tire was taken from the mold by C. R. Ewing, a veteran of 33 years with the company, while P. W. Litchfield, Goodyear board chairman, looked on.

Facilities for the annual output of 30,000 long tons of "cold rubber" went into production late in August at the government-owned plant at Houston, Tex., operated by Goodyear Synthetic Rubber Corp., subsidiary of Goodyear Tire, with the conversion of 24 of the plant's 48 reactors and installation of refrigeration equipment. Before conversion began, the plant had produced more than 600,000,000 pounds of standard GR-S, and the plant's remaining 24 reactors will continue production of this material.

Goodyear also announced a new tire especially designed for lightweight bicycles. Termed the Rib Lightweight, the tire is currently being manufactured in two sizes: 26 x 1¼ for American and English models; and 26 x 1-⅜ for English models. Built with relatively small cross-sections and contour designed to insure easier rolling, the new tire should give the maximum of easier riding, it is claimed.

WEST

Monsanto Reduces Prices

Monsanto Chemical Co., St. Louis 4, Mo., has announced that since the begining of the year prices have been reduced on 22 major products of its organic division. According to W. G. Krummrich, division general manager, the reductions were brought about by lowered prices for raw materials coupled with a number of operating economies. Reductions in prices per pound of Monsanto products to date include: coumarin, 25¢; anhydrous caffeine, $1; hydrous caffeine, 95¢; benzyl benzoate and potassium phenyl acetate, 12¢; beta-phenyl ethylamine, 20¢; phenyl acetamide, 20¢; para-amino salicylic acid, $3.15; para-acetyl amino benzenesulfonchloride, 40¢; dibutyl phthalate, 3¢; diethyl phthalate, 7.5¢; tricresyl phosphate, 9.5¢; phthalic anhydride, 1¢; and tetrachlorophenol, 1¢. Four Santicizers have been reduced in price from 3-6¢ per pound; while insecticides and herbicides were also cut in price, with Nifos-T lowered 15¢, and 2,4,5,-T dropping 34-45¢ per pound. In the heavy chemicals, zinc oxide was reduced $2.75 per hundred-weight, and salt cake declined $8 per ton.

Introduces New Chemical

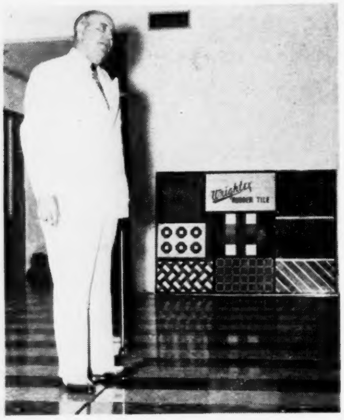
Monsanto on September 8 announced the development of a new chemical, given the temporary name AE-1, to a group of nine university professors attending the company's Two-Way Street Conference in Dayton, O., on September 8 and 9. According to Carroll A. Hochwalt, Monsanto vice president and director, the new chemical is a high molecular weight alcohol which has widespread potentialities as a chemical intermediate for resins, plastics, protective coatings, adhesives, and oil additives. In plastics AE-1 can be used as a plasticizer and a resin modifier for bituminous and asphalt-type compounds. As a plasticizer, it is compatible with cellulosic plastics and chlorinated rubber. In the protective coating field it is recommended for application in lacquers, varnishes, and as a pigment dispersant. For adhesives the new material is suggested as a plasticizer for casein-type and other water soluble glues as well as the non-water dispersible-type cements.

Griffith's Expansion Program

More than a quarter of a million dollars has been spent on modernization of plant facilities and purchase of new equipment by the Griffith Rubber Mills, 2439 N. W. 22nd Ave., Portland, Oreg., to improve facilities for the manufacture of roll covering for the paper industry, reports Z. A. Wise, vice president and general manager. Besides the purchase of a new building which provides addition for the new equipment, Griffith has also bought several vulcanizer tubes, one of which is said to be the largest on the Pacific Coast.

A multiple drill, one of three such machines in the United States, seven hydraulic presses, a Banbury and 60-inch mill and extruding machine also have been added. This equipment alone represents an investment of one hundred thousand dollars, Mr. Wise said.

In line with the company's expansion program, L. R. Bigler has been made manager of specialty sales division, which division manufactures marine products and rubber tile for home and commercial use.



Thomas F. Millane, President of Wright Mfg. Co., Addresses Gathering at Recent Plant Opening Ceremonies

Wright Mfg. Co., Houston, Tex., recently opened its new $3,000,000 plant, said to be the only plant in the country specifically designed for manufacturing rubber tile. A gathering of approximately 100 notables attended the opening ceremonies, which culminated from a decision made over a year ago to move the huge plant from Racine, Wis., to its present site in Houston. The Wright firm originated 27 years ago through the combined efforts of A. E. Wright, now vice president in charge of production, his brother, Clarence Wright, and the well-known rubber chemist, Leon J. D. Healy. Company President Thomas F. Millane, who combined Taylor Mfg. Co. and the Wright Rubber Co. into the present company, was responsible for the decision to move the plant and, with Mr. Wright, planned the new facilities for modern production of the company's rubber tile and other products.

Baldwin Rubber Corp., Pontiac, Mich., this year is celebrating its twenty-fifth anniversary.

J. M. Huber Corp., 342 Madison Ave., New York 17, N. Y., has appointed Edward J. Lewis Co., 9 S. Clinton St., Chicago, Ill., as its representative in the Chicago area, it was announced by R. H. Eagles, Huber vice president. Sales of Huber channel and furnace carbon blacks, clays, and rubber chemicals in Illinois and southern Wisconsin will be under the direction of Herbert Lewis, who recently returned from a tour of the Huber plants and research laboratories at Borger, Tex.; Langley, S. C.; and Huber, Ga. Mr. Lewis is a chemical engineering graduate of Purdue University.

Bauer & Black, Division of the Kendall Co., Chicago 16, Ill., has announced that, effective October 1, its line of pressure-sensitive industrial adhesive tapes will be known as Polyken industrial tapes. The change was made to establish a clearer distinction between the company's surgical dressings and industrial tapes, which have entirely separate sales and distributer organizations. The company's immediate plans include accelerated research and production schedules and vastly expanded merchandising and distribution programs for the Polyken tapes, while familiarizing present users with the new name.

American Latex Expanding

A major expansion move including the establishment of three branch offices and shifts in top executive personnel has been announced by C. M. Christie, president of American Latex Products Corp., 3341 W. El Segundo Blvd., Hawthorne, Calif. The firm is a large fabricator and distributer of foam rubber and also manufactures and distributes industrial adhesives, tapes, coatings, and allied products.

An office has been established at 2000 N. Second St., Philadelphia, Pa., primarily for covering and warehousing the company's new office chair cushions with Goodyear Airfoam fillers. This office is managed by J. F. Cody.

Michael Dougan has been placed in charge of the new Chicago, Ill., office at 4306 W. Armitage St.; while the Denver, Colo., branch at 1938 Broadway is headed by Ray Haley.

At the main office, Walter Clarke has been named vice president in charge of production; T. Patrick Dougan, formerly head of the company's Moltex division, has been appointed vice president in charge of sales; and Harry Gerstin has been promoted from head of the adhesives division to sales manager.

No changes have been made at the company's San Francisco and Seattle branch offices.

Lake Shore Tire & Rubber Co., Des Moines 6, Iowa, on October 1 changed its name to Armstrong Rubber Mfg. Co. This new name represents a change in name only; ownership, management, and operating policies continue as before.

OBITUARY

W. Emmett Bittner

THE vice president in charge of purchases for Diamond Alkali Co., Cleveland, O., W. Emmett Bittner, died September 2 in Pittsburgh, Pa., following an operation on August 2. Requiem Mass was sung at St. Bede's Church, Pittsburgh, on September 5.

Mr. Bittner was born in Pittsburgh on May 24, 1897. He attended public schools there, Duquesne University, and Carnegie Institute of Technology. In 1916 he joined Diamond Alkali in Pittsburgh, where company general headquarters were located until March, 1948. In 1919 the deceased was made a buyer in the purchasing department where he subsequently became assistant purchasing agent, purchasing agent and then director of purchases. In June of this year he was elected to the vice presidency.

An active member of the Pittsburgh Purchasing Agents Association, he had served as a director, vice president, and president, as a vice president of the 6th District Purchasing Agents Association, and on the executive committee of the national committee of the National Association of Purchasing Agents. Mr. Bittner also belonged to the Duquesne Club, the Pittsburgh Field Club, Pittsburgh Athletic Association, the Engineers Society of Western Pennsylvania, the Purchasing Agents Association of Cleveland, the Cleve-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land Chamber of Commerce, and the Cleveland Athletic Club.

Surviving are the widow, three sons, and two daughters.

Stephen S. Berry

STEPHEN S. BERRY, manager of the Kraft service and accessory sales of The General Tire & Rubber Co., Akron, O., and a leading authority on batteries, died suddenly at his home on September 5.

Mr. Berry was born in Philadelphia, Pa., on August 3, 1896. He was a graduate of Lafayette College.

His association with the rubber industry began 22 years ago when he started with the Converse Rubber Co. Later he was employed by Prest-O-Lite Battery Co. and then by Firestone Tire & Rubber Co. He joined General on May 1, 1936, and was in charge of battery sales before his appointment as manager of the Kraft service in 1946.

The deceased was also a member of the Knights of Columbus (Fourth Degree), Holy Name Society, and the American Legion.

Requiem Mass was sung on September 8 at St. Sebastian's Church in Akron.

Surviving Mr. Berry are his wife, two sons, a daughter, and two sisters.

A. Donald Cummings

A. DONALD CUMMINGS, chief chemist of Collyer Insulated Wire Co., Inc., Pawtucket, R. I., died September 1 from cerebral embolism. Funeral services were on September 4 at Warren, R. I., followed by burial at Forest Chapel Cemetery, Barrington, R. I.

Born September 28, 1903, Mr. Cummings was a graduate of Bowdoin in 1925 and received his M.A. degree from Harvard in 1926. After graduation from Harvard he was the recipient of the Goodyear Fellowship. In 1929 he became associated with the Bureau of Standards in Washington, D. C., and remained there until 1932, when he joined the American Steel & Wire Co., Worcester, Mass. In 1936 the deceased left American Steel to begin employment with Collyer Insulated Wire.

Mr. Cummings was a member of the board of directors of the American Chemists Society and of the Providence Engineering Society.

Surviving are the widow and three children.

Compounding Ingredients—Price Changes and Additions

Carbonex S	lb.	$0.04 / $0.045
S Plastic	lb.	.0385/ .0435
Crown clay	ton	14.00 / 33.00
Emersol 110	lb.	.14 / .15
120	lb.	.145 / .155
130	lb.	.1675/ .1775
210 Elaine	lb.	.115 / .1375
Emery 600	lb.	.0925/ .115
Hyfac 431	lb.	.165 / .175
Indonex	gal.	.11 / .17
Indopol H-100	gal.	.85 / 1.00
H-300	gal.	1.12 / 1.27
Litharge, Eagle	lb.	.175 / .176
Micronex	lb.	.065 / .1175
Red lead, Eagle	**lb.**	**.185**
Staflex IXA	lb.	.36 / .37
OY	lb.	1.75
QMXA	lb.	.60
White lead, Eagle	lb.	.1675/ .1775
Silicate, Eagle	lb.	.1825/ .20
Zinc oxide, Eagle,		
35% leaded	lb.	.12⅝/ .12⅞
50% leaded	lb.	.1325/ .135

NEWS ABOUT PEOPLE

C. Benson Branch

C. Benson Branch, of the plastics division of The Dow Chemical Co., Midland, Mich., has been named manager of the firm's technical service and development division, which is responsible for market studies and the sale and development of new products as well as the performance of technical service for the firm's customers. In 1937 on graduation from college, Mr. Branch joined Dow and spent his first year in a student-training program. Next, until 1941, he participated in the cellulose products research and development program and from 1941 through 1942 was responsible for the sale of extruded plastic products. During the war years after 1942, Mr. Branch was a production superintendent of Dow's Texas styrene plant. He also had charge of benzene recovery from petroleum by-products and of the cracking of polypropyl benzene for aviation fuels. Then in 1946 he assumed charge of the coatings and raw materials section of the firm's plastics division. In his 12 years with the firm Mr. Branch has been closely associated with the plastics, paper, paint, rubber, and petroleum industries.

E. F. Luna, advertising manager of Anaconda Wire & Cable Co., New York, N. Y., has been appointed sales promotion manager.

T. Tyler Sweeney, vice president and a director of E. H. Rollins & Sons, New York investment firm, on September 19 was elected a director of Seiberling Rubber Co., Akron, O., to succeed Warren H. Snow, president of E. H. Rollins & Sons, who has resigned.

Jewett F. Neiley, a director and hide buyer of Endicott-Johnson Corp., Endicott, N. Y., has been named to a four-man commission to Germany to confer with the ECA.

Stuart H. Ralph, a vice president and a director of Flintkote Co., New York, N. Y., last month was elected president of the Insulating Siding Association at its annual meeting in Chicago, Ill.

W. J. Sears, vice president of The Rubber Manufacturers Association Inc., New York, N. Y., on September 9 moved to the organization's Washington Office, 715 Ring Bldg., Washington 6, D. C. This move was made with a view to expanding the services of the RMA Washington staff in work with the security agencies and the rubber production and rubber control offices of the government. Mr. Sears served with several key government agencies during the war, including a tour of duty as Rubber Director in the reconversion period. He has since served as special consultant to ECA and the National Security Resources Board.

Kenneth H. Mac Watt, formerly with American Locomotive Co., has been made director of engineering sales for L. O. Koven & Brothers, Inc., manufacturer of boilers, tanks, special process equipment and weldments, 154 Ogden Ave., Jersey City 7, N. J. Mr. Mac Watt succeeds W. D. Birch, resigned.

Robert B. Reynolds has been transferred from the San Francisco office of Taylor Instrument Cos, Rochester, N. Y., to Chicago, where he will become assistant manager, assisting L. Lawrence Forward, who has managed the company's Chicago operations since the end of the last war. Mr. Reynolds' chief responsibility will be to head up the sale of industrial instruments and supervise the constantly growing sales staff in the Chicago area. He joined Taylor in 1940 upon graduation from Leland Stanford University as a chemical engineer. He served overseas from 1943 to 1945 as a first lieutenant in the Marine Corps.

Alfred G. Susie, chief chemist at Marbon Corp., Gary, Ind., for the past 4½ years, has been appointed supervisor of plastics research at Armour Research Foundation or Illinois Institute of Technology, Chicago, Ill., and will be in charge of research projects dealing with plastics in the chemistry and chemical engineering department of the Foundation. While at Marbon, Dr. Susie worked on rubber compounding, plastics, and rubber-to-metal adhesives. From 1939 to 1945, he was project leader for Esselen Research Corp., Boston, Mass., where he engaged in chemical consulting work, and from 1932 to 1936 was a chemist at the Sun Oil Co., Toledo, O.

David Neill has been appointed, by Farrel-Birmingham Co., Inc., Ansonia, Conn., its Cincinnati sales representative for gears, gear units, and flexible couplings manufactured in its Buffalo plant. Mr. Neill joined the F-B sales department in April, 1945, after three years in the gear manufacturing division.

M. Adolph Heikkila has formed a public relations consulting service at 35-15 91st St., Jackson Heights, L. I., N. Y. He had formerly been with The New Jersey Zinc Co., directing the public relations activities in connection with luminescent pigments and other new products. Previously Mr. Heikkila had operated his own industrial advertising agency for ten years and before that had been with Johns-Manville Corp., Vacuum Oil Co., and Butterick Publishing Co.

Patents and Trade Marks

APPLICATION

United States

2,476,820. **Resilient Seat.** H. C. Flint, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,828. **Endless Band Track of Cable-Reinforced Rubber.** A. B. Skromme, St. Joseph, Mich., assignor to Firestone Tire & Rubber Co., Akron, O.

2,476,831. **Curing Bag.** C. N. Spencer, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,476,855. **Cushioning Structure Including a Mixture of Fibers and Pieces of Foamed Rubber Bonded by an Elastic Binder Applied as a Lattice Work over the Surface of the Mixture.** H. M. Gaarder and R. E. Cooper, assignors to Wilson & Co., Inc., all of Chicago, Ill.

2,477,489. **Bathing Cap Ensemble.** R. P. Loy, Long Beach, Calif.

2,477,706. **Underwater Breathing Mask.** M. W. Taylor, Maplewood, Mo.

2,477,754. **Pneumatic Tire for Airplane Tail Wheels.** H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.

2,477,852. **Structure Including Parallel Spaced Panels of Glass Fabric Reinforced Thermoset Resin, and a Core Structure of Fiber Reinforced Resin, the Whole Impregnated and Bonded together with a Thermoset Resin Adhesive.** C. E. Bacon, Newark, O., assignor to Owens-Corning Fiberglas Corp., a corporation of Del.

2,477,960. **Mat of Resilient Material Formed with Intersecting Ribs and Provided with a Reinforcing Backing Integrally Formed with the Mat Material.** J. R. Caldwell, assignor to Wooster Rubber Co., both of Wooster, O.

2,478,108. **Resilient Mounting Including a Rubber Bridging Member.** G. H. Kaemmerling, assignor to Lord Mfg. Co., Erie, Pa.

2,478,126. **One-Piece, Lightweight Diver's Suit Made for the Most Part of Stretchable Knit Fabric Coated on Its Outer Surface with Rubber.** C. A. Ostby, Jr., Mishawaka, Ind., assignor to United States Rubber Co., New York, N. Y.

2,478,165. **In Low-Pressure Molding Apparatus, a Resilient Gasket Mounted about the Mold Form, a Deformable Surface on the Other Mold Part, and an Impervious Sheet between These Mold Parts.** H. W. Collins, Newark, O., assignor to Owens-Corning Fiberglas Corp., a corporation of Del.

2,478,186. **Storage Battery Separator Including a Porous Sheet of Glass Fibers Bonded by a Phenolic Resin and a Thin Slightly Porous Sheet of Synthetic Resin Material Bonded to the Glass Fiber Sheet by a Phenolic Resin.** L. S. Gerber, Lakewood, N. J.

2,479,006. **Overshoe of Vinylic Material.** P. E. Garth, Kansas City, Mo.

2,479,501. **Protective Light Transmitting Medium Including a Film of Polyvinyl Acetaldehyde Containing a Cupric Salt.** M. Marks, Dayton, O.

2,479,714. **Tire for Amphibious Airplanes and Vehicles.** R. A. Bell, Miami, Fla.

2,479,958. **Tire Tread.** W. S. Norman, Jr., Danville, Va.

2,480,005. **Wire Rope Including a Plurality of Metal Strands Surrounding a Core of Elastic Material.** A. T. Ewell, assignor to D. P. Gavan, both of Atlanta, Ga.

2,480,035. **Resilient Structure Forming Air Cells in a Ventilated Boot.** A. O. Lindstrom, Spokane, Wash.

Dominion of Canada

458,285. **Rubber Faced Paving Block.** L. Gaisman, Audenshaw, Manchester, England.

458,419. **Sandwich Mounting Including Members Spaced Apart and therebetween an Element of Resilient Material Such as Rubber.** H. C. Lord, assignor to Lord Mfg. Co., both of Erie, Pa., U.S.A.

458,430. **Roll of Pressure-Sensitive Transparent Tape Including a Cellulose Film Backing, a Polyvinyl Alcohol-Latex Primer Film, and a Transparent Pressure-Sensitive Adhesive Rubber-Resin Coating.** R. I. Coulter, White Bear Township, assignor to Minnesota Mining & Mfg. Co., Saint Paul, both in Minn., U.S.A.

458,458. **Shuttlecock Made of Sponge Rubber.** A. M. Timpe, Los Angeles, Calif., U.S.A., assignor to Reinforced Shuttlecocks Ltd., London, England.

458,529. **Two-Way Door Stop of Rubber.** A. E. Witham, London, Ont.

458,596. **Composite Strip for Forming the Tread and Sidewall Coverings of a Vehicle Tire.** C. L. Beward, assignor to General Tire & Rubber Co., both of Akron, O., U.S.A.

458,598. **Vaned Tire.** J. O. Antonson, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

458,964. **Filtration Sponge of Regenerated Cellulose.** T. F. Banigan and W. D. White, both of Kenmore, N. Y., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

United Kingdom

625,896. **Pneumatic Tires.** Firestone Tire & Rubber Co.

626,925. **Tire Treads.** Firestone Tire & Rubber Co.

625,937. **Resin Bonded Cellulosic Fibrous Materials, Particularly Cords.** Wingfoot Corp.

626,016. **Windshield Cleaners.** Trico Products Corp.

626,404. **Squeegees.** J. M. Denton.

626,597. **Packaging.** Wingfoot Corp.

626,747. **Shock Absorbers.** Dunlop Rubber Co., Ltd., and H. F. L. Jenkins.

626,809. **Resilient Mountings.** Ford Motor Co., Ltd.

626,819. **Footwear.** Plastifiex Products Ltd., T. Spencer, and A. E. Salmon.

626,837. **Flexible Tubular Connectors of Rubber or the Like.** H. F. Brooke and J. Meyer, Jr.

PROCESS

United States

2,477,899. **Inflatable Rubber Articles.** D. G. Rempel, assignor, by mesne assignments, to Rempel Mfg., Inc., both of Akron, O.

2,478,013. **Preparing and Fashioning Thermoplastic and Thermosetting Materials.** F. M. Roddy, Providence, R. I.

2,478,121. **Heat-Sealing Flexible Thermoplastic Sheets or Films.** H. G. Morner, New York, N. Y.

2,478,265. **Shaped Structures from a Solution of a Piperidyl Cellulose Derivative.** D. L. Green, Buffalo, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,478,267. **Composite Products.** W. R. Hickler, Winthrop, Mass., assignor to B. F. Goodrich Co., New York, N. Y.

2,478,599. **Producing a Latex Foam Coating on a Latex Film.** A. N. Spanel, Princeton, N. J.

2,478,600. **Depositing Preformed Layers of Latex Foam on a Latex Film.** A. N. Spanel, Princeton, N. J.

2,479,474. **Anti-Skid Retread for Tires.** D. E. Crooker, Ontonagon, Mich.

2,479,919. **Covering a Wire Having Interstices therein.** J. E. Flood, assignor to Plastic Wire & Cable Corp., both of Norwich, Conn.

2,480,604. **Preparing the Edge of a Carpet Having a Backing of Resilient Cellular Rubber.** A. T. Dildilian Suffield, assignor to Bigelow-Sanford Carpet Co., Inc., Thompsonville, both in Conn.

Dominion of Canada

458,383. **Coating an Electrical Conductor or the Like with a Synthetic Linear Polyamide.** L. A. Burrows, Woodbury, N. J., W. E. Lawson, Wilmington, Del., and C. B. Van Winter, Wenonah, N. J., all in the U.S.A., assignors to Canadian Industries Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

458,386. **Coating an Insulated Wire with a Polymerized Synthetic Aliphatic Hydrocarbon Composition.** L. A. Burrows, Woodbury, N. J., W. E. Lawson, Wilmington, Del., and C. B. Van Winter, Wenonah, N. J., all in the U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

458,429. **Pressure-Sensitive Adhesive Sheeting.** W. J. Mohr, Passaic, N. J., assignor to Minnesota Mining & Mfg. Co., St. Paul, Minn., both in the U.S.A.

458,457. **Forming Latex Threads.** A. O. Ryan, Independence, Ky., assignor to Redding Mfg. Co., Inc., Norwalk, Conn., both in the U.S.A.

458,581. **Corrugated Tube.** W. G. Harding, Ridgewood, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

458,621. **Making a Microporous Butadiene Copolymer.** R. G. Chollar, assignor to National Cash Register Co., both of Dayton, O., U.S.A.

458,800. **Centrifugally Forming Asymmetric Plastic Sheets.** R. S. Ames, assignor to Goodyear Aircraft Corp., Akron, O., U.S.A.

458,874. **Casting Resin.** R. T. Hickcox Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

United Kingdom

625,905. **Pressure Molding Thermosetting Materials.** J. C. Arnold (Lester Engineering Co.).

625,932. **Press Powder Molding.** Standard Telephones & Cables, Ltd., and F. W. May.

626,055. **Tubes from Artificial Resins, Rubber, Etc.** S. P. A. Lavorazione Materie Plastiche.

626,127. **Corrosion Resistant Coatings on Metals.** R. Mercer (Rheem Research Products, Inc.).

626,316. **Reconditioning Pneumatic Tires.** H. Simon, Ltd., and G. B. Lett.

626,428. **Composite Articles.** United States Rubber Co.

626,860. **Jointing of Cellulose and Like Sheet Material.** A. H. Bland

CHEMICAL

United States

2,477,608-610. **Copolymeric Vinylidene Chloride Compositions Readily Extrudable without Thermal Decomposition to Form Transparent, Non-Exuding Odorless Articles.** C. R. Irons, Midland, and C. B. Havens, Hope, assignors to Dow Chemical Co., Midland, both in Mich.

2,477,611-614. **Vinylidene Chloride-Vinyl Chloride Copolymer Compositions for Making Shrinkable Translucent Films.** C. R. Irons, assignor to Dow Chemical Co., both of Midland, Mich.

2,477,641. **Resinous Reaction Product of an Anhydrous Polyhydroxy Benzene and an Anhydrous Aldehyde.** F. J. Nagel, Pittsburgh, assignor to Westinghouse Electric Corp., East Pittsburgh, both in Pa.

2,477,655. **Condensates of Rosin with Unsaturated Heterocyclics.** A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,477,656-659. **Copolymeric Vinylidene Chloride Compositions Including Two to Three of the Following Modifiers: Tetrasodium Pyrophosphate; 4'-Tertiary-Butyl Phenyl Salicylate; Alkyl Phthalyl Ethyl Glycolate; Tribarium Orthophosphate; Ethyl Orthobenzoyl Benzoate; Methyl Phthalyl Ethyl Glycolate; Ethyl Phthalyl Ethyl Glycolate; 3-(2-Xenoxy)-1,2-Epoxy Propane.** H. L. Schaefer, assignor to Dow Chemical Co., both of Midland, Mich.

2,477,672. **Preparation of Organic Nitriles.** I. D. Webb and G. E. Tabet, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,477,717. **Vinyl Resins Plasticized with Polyalkylnaphthalenes.** P. L. Brandt, Galveston, Tex., assignor to Pan American Refining Corp., Texas City, Tex.

2,477,784. **In the Aqueous Emulsion Polymerization of a Vinyl Aromatic Compound of the Benzene Series, Dispersion in the Emulsion, Prior to Completion of Polymerization of a Chromium Compound Containing Chromium as a Positive Ion.** E. C. Britton and W. J. Le Fevre, assignors to Dow Chemical Co., all of Midland, Mich.

2,477,809. **Reclaiming a Vulcanized Rubber Polymer of a Conjugated Diolefinic Compound with the Aid of a Catalyst Consisting of a Mixture of a Water-Insoluble Aliphatic Amine and a Phosphoric Acid.** J. H. Kelly, Jr., Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O.

2,478,015. **Unsaturated Liquid Ester Capable of Curing under Heat Including the Reaction Product of Pentaerythritol with a Beta-Unsaturated Monohydric Alcohol Monoester of a Dicarboxylic Acid.** J. B. Rust and W. B. Canfield, both of Montclair, N. J., assignors by direct and mesne assignments, of one-half to Montclair Research Corp., and one-half to Ellis-Foster Co., both corporations of N. J.

2,478,036. **Vulcanizing Butadiene-Styrene and Butadiene-Acrylonitrile Copolymers in the Absence of Sulfur by Incorporating a Halogenated Aliphatic Hydrocarbon and a Metal Oxide.** A. A. Baum, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

DOW CORNING SILICONE MOLD RELEASE EMULSIONS

TOPS FOR HOT, FAST CYCLE MOLDING

FIRM: NICHOLS ENGINEERING,
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SOLUTION: DC Mold Release Emulsion No. 35.

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2,478,038. **Beta-Substituted Ethyl-Mercapto Polymers.** W. J. Burke, Marshallton, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,478,045. **Stabilization of Butadiene with Salicylates.** L. F. Hatch, Austin, Tex., and D. E. Adelson and B. O. Blackburn, Berkeley, assignors to Shell Development Co., San Francisco, both in Calif.

2,478,066. **Polymerization of Olefins in the Presence of an Acidic Organic Nitrogen.** A. J. van Peski, deceased, late of Amsterdam, by C. C. J. van Peski, executrix, Bussum, both in Netherlands, assignor to Shell Development Co., San Francisco, Calif.

2,478,229. **Preparing Concentrated Aqueous Colloidal Dispersions of Polytetrafluoroethylene.** K. L. Berry, Hockessin, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,478,243. **As a New Chemical Compound, Mono-Nitro-Butadiene Having a Boiling Point of 118-119° C.** C. S. Coe, Long Beach, and T. F. Doumani, assignors to Union Oil Co. of California, both of Los Angeles, Calif.

2,478,390. **Polymerization of Monoolefinic Hydrocarbons in the Presence of Saturated Aliphatic Esters of Inorganic Oxy Acids of Phosphorus, Sulfur, and Silicon.** W. E. Hanford, Short Hills, N. J., and R. M. Joyce, Jr., Holly Oak, assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,478,416. **Preparation of a Soluble, Fusible Polymer of Crotyl Methacrylate.** H. C. Miller, Claymont, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,478,[illegible] **Vinyl Diethylphosphonoacetate.** R. H. Wiley, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,478,495. **Interpolymer of Vinyl Benzylidene Diacetate and Vinyl Acetate.** C. S. Marvel, Urbana, Ill., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,478,627. **Copolymers of Vinyl Acetate, Vinyl Benzoate, and an Alkyl Acrylate.** G. E. Ham, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,478,703. **Recovery of Rubber-Like Polymers from Purge Water.** T. G. Moore, Sarnia, Ont., Canada, assignor to Standard Oil Development Co., a corporation of Del.

2,478,718. **Anti-Tack Agent for a Rubbery Polymer Prepared by Forming a Saturated Solution of Sodium Stearate in Water, Adding Zinc Sulfate, Agitating Violently, and Controlling the pH of the Mixture between 8 and 8.5 by Adding Sodium Hydroxide and Sodium Sulfonate.** H. M. Singleton, Goose Creek, Tex., assignor, by mesne assignments, to Standard Oil Development Co., Elizabeth, N. J.

2,478,737. **Copolymers of 2-Chloro-1,3 Butadiene and 1,3-Butadiene or Isoprene, Having Improved Stability against Deterioration Due to Aging.** R. S. Barrows, Claymont, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,478,738. **Emulsion Polymerization of a Mixture of 2-Chloro-1,3-Butadiene and 1,3-Butadiene Hydrocarbon under Acid Conditions in the Presence of a Tetraalkyl-p.p'-Diamino-Diphenyl Methane.** R. S. Barrows, Claymont, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,478,826. **Reclaiming Synthetic Rubber with the Aid of Phenyl-Beta-Naphthylamine.** T. A. Johnson and H. H. Thompson, assignors to Wingfoot Corp., all of Akron, O.

2,478,827. **Reclaiming a Vulcanized Butadiene-Styrene Copolymer by Treating with Alkali and Then Masticating with an Acidic Metal Salt of an Inorganic Acid from the Group of Aluminum and Zinc Salts.** T. A. Johnson and H. H. Thompson, assignors to Wingfoot Corp., all of Akron, O.

2,478,860. **Copolymer of Vinyl Furane and Vinylidene Chloride.** A. M. Clifford, Stow, assignor to Wingfoot Corp., Akron, both in O.

2,478,862. **Color Stabilization of Vinyl Halide Resins.** F. W. Cox, Cuyahoga Falls, and J. M. Wallace, Jr., assignors to Wingfoot Corp., both of Akron, both in O.

2,478,879. **Porous Resinous Product from a Blend of a Copolymer of Vinyl Chloride and a Dialkyl Ester of a Butenedioic Acid, and a Polyvinyl Acetal Resin.** W. T. L. Ten Broeck, Jr., assignor to Wingfoot Corp., both of Akron, O.

2,478,914. **Benzothiophenes.** B. S. Greensfelder, Oakland, and R. J. Moore, Berkeley, assignors to Shell Development Co., San Francisco, all in Calif.

2,478,932. **Manufacture of 1,1,1-Trifluoroethane.** C. B. Miller, St. Albans and F. H. Bratton, Floral Park, both in N. Y., assignors to Allied Chemical & Dye Corp., a corporation of N. Y.

2,478,933. **Manufacture of 1,1-Chlorofluoroethylenes.** F. H. Bratton, Floral Park, and G. M. Weimann, now, by change of name, G. M. Wyman, New York, both in N. Y., assignors to Allied Chemical & Dye Corp., a corporation of N. Y.

2,478,943. **Copolymer Phenolic Adhesive Containing the Intercondensation Product of a Monohydric Phenol and a Polyhydric Phenol.** P. H. Rhodes, Kingston, N. Y., assignor, by mesne assignments, to Koppers Co., Inc., a corporation of Del.

2,478,989. **Mixing Vinyl Acetate and Formaldehyde in a Lower Fatty Acid Solvent Containing a Strong Mineral Acid to Produce Acrolein.** J. F. Walker, Westfield, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,479,018. **Butadiene-Acrylonitrile Copolymer Including Di-p-Isobutyl Sebacate and Having Improved Low-Temperature Flexibility.** L. Nicholl, Nyack, and G. Kesslin, New York, assignors to Kay-Fries Chemicals, Inc., West Haverstraw, all in N. Y.

2,479,090. **Thermosetting Condensation Product of Formaldehyde and Melamine Plasticized with a Polyester Resin.** H. P. Wohnsiedler, Darien, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,479,146. **Binary Copolymer of Vinyl Acetate and 1,3-Dioxolane.** W. H. Wood, Arden, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,479,241. **Emulsifying Polymerizable Compounds and Effecting Polymerization with These Emulsions.** E. C. H. Kolvoort and G. Akkerman, Amsterdam, Netherlands, assignors to Shell Development Co., San Francisco, Calif.

2,479,306. **Copolymers of Styrene with Furan or Monoalkyl Furan.** T. L. Cairns, Wilmington, Del., A. W. Larchar, Mendenhall, Pa., and B. C. McKusick, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington.

2,479,360. **Continuously Preparing Solid Polymerization Products from a Mixture of Isobutylene and a Conjugated Diolefin of 4 to 6 Carbon Atoms.** F. A. Howard, Elizabeth, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,479,367. **Fluoroethylene/Ethylene Interpolymers.** R. M. Joyce, Jr., Wilmington, and J. C. Sauer, Woodcrest, assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,479,374. **Organo-Silicon Compounds.** R. H. Krieble, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,479,409. **As Interior for Coating for Metal Food and Beverage Containers, a Composition Including a Copolymer of Vinyl Chloride with Dimethyl Fumarate, and a Heat-Hardening Phenol-Formaldehyde Resin.** M. J. Roedel, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,479,410. **Coating Composition Including a Homogeneous Blend of a Fatty Oil Acid Glyceride and a Vinyl Resin Which Is a Copolymer of Vinyl Chloride and Haloethylene Containing at Least One Fluorine Atom.** H. S. Rothrock and W. J. Wayne, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,479,418. **Low-Temperature Polymerization of a Mixture of Anhydrous Isobutylene, a Diolefin of 4 to 5 Carbon Atoms and an Alkyl Halide, in the Presence of a Friedel-Crafts Catalyst and in the Presence of Olefin Dimers.** H. G. Schutze, Goose Creek, Tex., assignor, by mesne assignments, to Standard Oil Development Co., Elizabeth, N. J.

2,479,450. **Chemical Process for Tripolymers Including Isobutylene, a Multiolefin Having 4 to 10 Carbon Atoms, and a Chlorinated Styrene.** D. W. Young, Roselle, and W. J. Sparks, Cranford, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,479,486. **Copolymer of Styrene, an Alpha Beta Ethylenically Unsaturated, Alpha Beta Dicarboxylic Acid, and a Polyester.** H. L. Gerhart, Milwaukee, Wis., assignor to Pittsburgh Plate Glass Co., Allegheny County, Pa.

2,479,490. **Rubbery Reaction Product of Butadiene Hydrocarbons and Saturated Aliphatic Compounds.** H. M. Guinot, Versailles, and R. Buret, Melle, assignors to Les Usines de Melle (S.A.), Saint-Leger-les-Melle, all in France.

2,479,542. **Preparation of Mercaptans.** J. C. Patrick, Morrisville, Pa., assignor to Thiokol Corp., Trenton, N. J.

2,479,618. **Low-Temperature Friedel-Crafts Polymerization of Alpha Alkyl Styrenes in Carbon Disulfide Solution.** A. B. Hersberger, Drexel Hill, and R. G. Heiligmann, Yeadon, assignors to Atlantic Refining Co., Philadelphia, all in Pa.

2,479,671. **Sulfur-Vulcanized Composition Including Butadiene-Acrylonitrile or Butadiene-Styrene Polymer, and an Incompletely Dehydrochlorinated Chlorinated Paraffin Hydrocarbon of 6 to 27 Carbon Atoms.** S. J. Cohen, Rochester, and W. E. Scheer, Jackson Heights, both in N. Y., Scheer assignor to Cohen.

2,479,815. **Hydrogenation Products of N-Phenyl-3,5-Diethyl-2-Propyldihydropyridine.** D. Craig, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,479,918. **A Vinyl Chloride Resin Which Contains Tetra-Alpha Thienyl Tin and Is Stable against Discoloration at Elevated Temperatures.** J. K. Fincke, Dayton, and E. W. Gluesenkamp, Centerville, both in O., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,479,957. **Vinyl Fluoride Polymers.** A. E. Newkirk, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,479,996. **Preparation of Mercaptans and Alkyl Sulfides.** R. T. Bell and C. M. Thacker, Highland Park, assignors to Pure Oil Co., Chicago, both in Ill.

2,480,007. **Chlorinated Polythene at Least 55% of Which Is Insoluble in Boiling Trichloroethylene Obtained by Treating Soluble Chlorinated Solid Polythene with an Iron Salt Soluble in Organic Solvents and Heating.** D. A. Fletcher, Pompton Plains, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,480,008. **Chlorinated Solid Polythene Convertible on Heating to a Form Having Reduced Solubility and Fusibility, and Containing an Oxide of Lead and a Peroxy Compound.** A. W. Anderson, North Arlington, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,480,009. **Chlorinated Polyethylene Compositions Containing a Thermal Carbon Black.** D. A. Fletcher, Pittsburgh, Pa., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,480,021. **Preparing Vinyl Fluoride by Contacting a Mixture of Acetylene, Hydrogen Fluoride and Hydrogen Chloride with a Catalyst Including Mercuric Chloride at a Temperature from 200 to 650° F.** J. C. Hillyer, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

Dominion of Canada

458,342. **Chlorinated Mixed Polymerizate of 1,3-Butadiene and Acrylic Nitrile.** G. F. D'Alelio, Pittsfield, Mass., U. S. A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

458,380. **Interpolymers of Diallyl Ethers, Acrylic Acid and Esters of Unsaturated Dicarboxylic Acids.** P. O. Tawney, Passaic, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

458,389. **Aqueous Emulsion of Synthetic Linear Polycarbonamide.** R. M. Leekley, Wilmington, Del., U.S.A., assignor to Canadian Industries Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

458,390. **Composition Including a Polyvinyl Acetal Resin and, as a Softening Point Elevating Agent therefor, an Ether of an N,N'-Bis(Hydroxymethyl)Urea.** C. W. Johnson, New Brunswick, N. J., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

458,391. **Synthetic Linear Polyamide Plasticized with a Monohydric Alcohol Ester of Phenylolstearic Acid.** F. C. McGrew, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

458,418. **Improved Synthetic Rubber Obtained by Mechanically Working a Mix of the Rubber and at Least One Acid Derivative from the Class of Solid and Liquid Anhydrides and Chlorides of Organic Carboxylic Acids and of Inorganic Acids in Which the Acid-Forming Element Is in Its Highest Stage of Valency, Heating, Then Incorporating Vulcanizing Ingredients, and Curing.** R. Buret, Melle, assignor to Les Usines de Melle, S.A., Saint-Leger-Les-Melle, both in France.

458,472. **Monosulfide Polymer.** J. C. Patrick, Morrisville, Pa., assignor to Thiokol Corp., Trenton, N. J., both in the U.S.A.

458,544-547. **Dimethyl Styrene and p-Methyl Styrene.** J. K. Dixon, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

458,553. **An Acrylate Resin Having Incorporated an Ester of an Aromatic Hydroxy Acid to Decrease the Transmission of Ultra-Violet Light therethrough.** K. M. Thompson, Aldan, assignor to Atlantic Refining Co., Philadelphia, both in Pa., U.S.A.

458,582. **Butadiene-Styrene Copolymer Cements.** E. G. Bargmeyer, Mishawaka, Ind., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

458,595. **Heat Polymerizable N-Vinyl Pyrrole Compounds Stabilized toward Polymerization below 100° C. by the Addition of Morpholine.** W. Freudenberg, Cranford, N. J., assignor to General Aniline & Film Corp., New York, N. Y., both in the U.S.A.

458,597. **Stable Adhesive Composition Obtained from a Solution of a Partially Condensed Resinous Product of a Phenol and Furfural to Which a Solution of a Natural or Synthetic Rubber Is Added.** M. E. Gross, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

458,647. **Polymerizing in the Presence of from 1.1 to 10% of a Peroxide Polymerization**

Catalyst, a Solution of a Monomer of an Unsaturated Polyester of a Polybasic Acid and Thermal Polymer of the Polyester. E. C. Shokal, Oakland, and L. J. Szabo, Berkeley, assignors to Shell Development Co., San Francisco, all in Calif., U.S.A.

458,652. **Composition Including a Solid Solution of a Solid Copolymer of Isobutylene and Styrene with Solid Simple Polyisobutylene and Solid Polystyrene.** W. J. Sparks, Cranford, and L. B. Turner, Roselle Park, assignors to Standard Oil Development Co., Linden, all in N. J., U.S.A.

458,745. **Composition Including Styrene and a Crystalline Unsaturated Alkyd Resin.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

458,782. **Adhesive Composition Including Hydrolyzed Polyvinyl Acetate, Heat-Hardenable Phenol-Aldehyde Resin, Hardening Agent, Red Iron Oxide, Inorganic Oxidizing Agent, an Alkaline-Earth Metal Oxide, and a Solvent.** C. F. Brown, Middlebury, Conn., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

458,783. **Cellular Resin Material from a Thermosetting Resin, a Blowing Agent, and a Metal Stearate.** L. E. Nye, Elkhart, Ind., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

458,786. **Resinous Composition of Urea-Aldehyde and Hydrolyzed Interpolymer of a Vinyl Ester.** A. F. Smith, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

458,787. **Photopolymerization of Vinylidene Compounds with Organic Disulfides.** L. M. Richards, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

458,788. **Copolymerization of Styrene and Maleic Acid Half Esters.** W. E. Lundquist, Minneapolis, Minn., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

458,812. **Sponge Rubber from a Latex Foam Containing Zinc Oxide, an Alkali-Salt Sequestering Agent for Polyvalent Zinc Ions, an Alkylated Phenyl Monoether of Polyethylene Glycol, and a Slightly Soluble Salt of Fluosilicic Acid.** W. J. Clayton, Detroit, Mich., and P. V. Butsch, South Bend, Ind., both in the U.S.A., assignors to International Latex Processes, Ltd., London, England.

458,869. **Butadiene.** W. J. Mattox, Baton Rouge, La., assignor to Universal Oil Products Co., Chicago, Ill., both in U.S.A.

458,963. **Polymerization of an Aqueous Dispersion Containing Methyl Methacrylate and a Thiol.** B. W. Howk, Wilmington, and F. L. Johnston, Claymont, both in Del., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

458,965. **Polyvinyl Thioglycolate.** E. F. Izard, Kenmore, N. Y., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

458,968. **Preparation of Polymeric Methyl Methacrylate Modified by a Mercaptan.** J. L. Quinn, Matawan, N. J., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

458,969. **Preparation of a Hydrolyzed Interpolymer of Vinyl Acetate with Ethylene.** L. Plambeck, Jr., Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

United Kingdom

624,225. **Thermoplastic Elastomers of Polyvinyl Chloride.** Boothby & Thompson, Ltd., S. Szekely, and C. A. Redfarn.

624,312. **Vulcanized Polyfurfuryl Products.** J. B. Pierce Foundation.

624,393. **Compositions Including Polymers and Interpolymers of Vinyl Chloride.** Imperial Chemical Industries, Ltd., and K. W. and P. A. Small.

624,437. **Synthetic Resins.** Soc. L'Impregnation.

624,438. **Stabilization of Rubber.** Firestone Tire & Rubber Co.

624,634. **Vinyl Halides.** B. F. Goodrich Co.

624,792. **Rosin Styrene Interpolymers.** Dow Chemical Co.

624,917. **Preservation of Rubber Latex.** Imperial Chemical Industries, Ltd., G. F. Flint, and H. Taylor.

625,144. **Synthetic Resinous Products.** F. H. Levey & Co., Inc.

625,162. **Synthetic Elastoprenes.** Usines de Melle.

625,292. **Polymerization.** British Celanese, Ltd.

625,348. **Tetrafluorpethylene Polymers.** Kinetic Chemicals, Inc.

625,493. **Polymerization of Unsaturated Phenolic Compounds.** Harvel Corp.

625,572. **Emulsion Polymerization of Conjugated Diolefins.** J. C. Arnold (Standard Oil Development Co.).

625,576. **Synthetic Resinous Compositions.** Bakelite, Ltd., J. G. Weighall, and E. G. K. Pritchett.

625,647. **Polymers and Copolymers of Diolefins.** Sharples Chemicals, Inc.

625,677. **Stably Tacky Pressure-Sensitive Adhesive.** Minnesota Mining & Mfg. Co.

625,747. **Synthetic Resins from Olefinic Compounds.** British Celanese Ltd.

625,828. **Rubber Latex Composition.** J. E. Sarphati and G. J. Sluiter.

625,845. **Vulcanization or Prevulcanization of Rubber or the Like and the Production of Rubber or Like Derivatives.** Rubber-Stichting.

625,847. **Synthetic Resinous Products.** L. N. Phillips.

625,872. **Rubber-Carbon Black Mixtures.** C. M. Blow.

625,877. **Polymerizable Materials and Polymers thereof.** Imperial Chemical Industries, Ltd., and R. Hammond.

626,032. **Polymerized Chloroprene-Cashew Nutshell Liquid Composition.** Harvel Corp.

626,050. **Porous Rubber Products.** I. A. Ionides (T. A. Te Grotenhuis).

626,054. **Interpolymers of Alpha-Haloacrylic Compounds and Polychloro-Styrene.** General Aniline & Film Corp.

626,145. **Synthetic Resins.** Westinghouse Electric International Co.

626,151. **Cellular Polyethylene.** Expanded Rubber Co., Ltd., A. K. Unsworth, A. G. Goodchild, and A. Cooper.

626,155. **Polymerization of Compounds Containing the Ethylenic Double-Bond.** E. I. du Pont de Nemours & Co., Inc.

626,185. **Vulcanization of Rubber and Like Materials.** Standard Oil Development Co.

626,300. **Polymerization Process.** Phillips Petroleum Co.

626,362. **Vinyl Naphthalene.** Koppers Co., Inc.

626,378. **Rubber Compositions.** Dewey & Almy Chemical Co.

626,380. **Treatment of Polyamides.** W. Harrison.

626,481. **Plasticizers.** Cie. Francaise de Raffinage.

626,486. **2-Mercapto-4-Keto-5,6-Dihydro-1,3-Thiazine.** B. F. Goodrich Co.

626,505. **Partial Depolymerization of Highly Polymerized Methyl Methacrylate.** Dohm, Ltd., and C. A. Redfarn.

626,525. **Treatment of Nitrogen-Containing Condensation Polymers.** J. W. Fisher, H. Bates, and E. W. Wheatley.

626,526. **Compositions of Nitrogen-Containing Linear Condensation Polymers.** J. W. Fisher, E. W. Wheatley, and G. W. I. Shea-vyn.

626,527. **Polymeric Materials.** J. W. Fisher and E. W. Wh[illegible]

626,536. **Moistureproof Heat-Sealable Sheet Wrapping Material.** British Cellophane, Ltd.

626,645. **Artificial Resin.** Quaker Oats Co.

626,763. **Resinous Compositions.** Westinghouse Electric International Co.

626,778. **Rubber Hydrochloride.** Frenkel's Machines (Gt. Britain), Ltd., B. Frenkel, and L. Mitlin.

626,876. **Dispersions of Synthetic Resins.** British Cellophane, Ltd., W. Berry, and C. R. Oswin.

626,909. **Siloxane Resins.** Dow Corning Corp.

626,988. **Materials Containing Polyvinyl Derivatives.** Soc. Rhodiaceta.

MACHINERY

United States

2,477,572. **Gasket Cutter.** F. Blasak, New York, N. Y.

2,477,604. **Machine for Impregnating Webs.** W. E. Holland and A. J. Stanley, both of New Brunswick, and J. A. Chestnut, Highland Park, both in N. J., assignors to Industrial Tape Corp., a corporation of N. J.

2,477,718. **Device to Mount Tire Bead Rings upon the Bead Applying Annulus of Tire Building Machines.** W. J. Breth, assignor to General Tire & Rubber Co., both of Akron, O.

2,477,858. **Pneumatic Tire Lifting and Spreading Machine.** D. B. Brabbin, Ashland, Oreg.

2,478,005. **Injection Molding Apparatus for Thermosetting or Thermoplastic Materials.** E. E. Novotny, Prospectville, Pa., assignor, by mesne assignments, to Borden Co., New York, N. Y.

2,478,199. **Apparatus to Form Plastic Articles.** G. A. Lyon, Allenhurst, N. J.

2,478,405. **Device for Bonding Brake Linings to Brake Shoes.** J. N. Kuzmick, assignor to Raybestos-Manhattan, Inc., both of Passaic, N. J.

2,478,616. **Apparatus for Continuously Making Vulcanized Articles.** G. P. Adams and G. E. Berggreb, both of Baltimore, Md., assignors to Western Electric Co., Inc., New York, N. Y.

2,478,940. **Apparatus for Adherently Applying a Second Covering of Textile Fabric to a Hose Having a First Covering of Textile Fabric.** K. Pape, deceased, late of Dover, by V. M. Pape, executrix, Dover, assignor to Resistoflex Corp., Belleville, both in N. J.

2,479,027. **Tire Building Apparatus.** F. S. Sternad, Cuyahoga Falls, and J. P. Sapp, Kent, both in O., assignors to B. F. Goodrich Co., New York, N. Y.

2,479,375. **Electric Heat Sealing Machine.** N. Langer, New York, N. Y.

2,479,493. **Apparatus for Repairing Tire Beads.** J. Horton-Wellings, Market Drayton, England.

2,479,527. **Apparatus to Produce Rubber Thread.** G. S. Van Voorhis, Easthampton, Mass.

2,479,804. **Plastic Material Extruder.** J. Bailey and R. W. Canfield, both of West Hartford, assignors to Plax Corp., Hartford, both in Conn.

Dominion of Canada

457,592. **Tire Spreader.** J. F. Downey, Toronto, Ont.

458,302. **Mold for Molding Foamed Latex and Adapted for Use in a High-Frequency Field.** J. A. Sperry, Talmadge, O., U.S.A.

458,457. **Means for Forming Latex Thread.** A. O. Ryan, Independence, Ky., assignor to Redding Mfg. Co., Inc., Norwalk, Conn.

458,581. **Means to Make Corrugated Tube.** W. G. Harding, Ridgewood, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

458,593. **Apparatus for Continuous Coagulation, Agglomeration, and Processing of Aqueous Dispersions of Synthetic Rubber.** E. T. Handley, assignor to Firestone Tire & Rubber Co., both of Akron, O., U.S.A.

458,729. **Apparatus for Making Sponge Rubber and Resinous Articles.** T. A. Te Grotenhuis, Olmsted Falls, O., U.S.A.

458,801. **Device to Form Thermoplastic Sheet Material.** R. S. Ames and J. C. Feldscher, both of Akron, O., and M. P. H. Peterson, Kewanee, Ill., assignors to Goodyear Aircraft Corp., Akron, both in the U.S.A.

458,840. **Apparatus for Forming Latex-Coated Filament.** A. O. Ryan, Independence, Ky., assignor to Redding Mfg. Co., Inc., Norwalk, Conn., both in the U.S.A.

UNCLASSIFIED

United States

2,478,214. **Tire Removing Tool.** H. G. Turner, Hammon, Okla.

2,478,371. **Tire Anti-Skid Device.** J. J. Cook, assignor to John J. Cook Mfg. Corp., both of Detroit, Mich.

2,478,580. **Removable Flange Construction.** C. Hollerith, Jackson, Mich., assignor, by mesne assignments, to B. F. Goodrich Co., New York, N. Y.

2,479,223. **Non-Metallic Sheath Cable Connector.** G. T. Evans, Brazil, Ind.

2,479,229. **Tire Spotter.** B. Goodman, assignor to Greenmount Mfg. Co., both of Baltimore, Md.

2,479,314. **Separable Tire Rim.** R. and S. Clark, both of Casa Blanca, and L. B. Moss, Riverside, both in Calif.

2,479,371. **Flat Tire Detector.** C. L. Kite, Radnor, assignor of two-thirds to P. E. Kite and one-third to I. Benson, Logansport, Ind.

2,479,432. **Tire Removing Machine.** J. H. Tillotson, Spartanburg, S. C.

2,479,708. **Improving Carbon Black for Compounding with Rubber.** F. H. Amon, Weston, assignor to Godfrey L. Cabot, Inc., Boston, both in Mass.

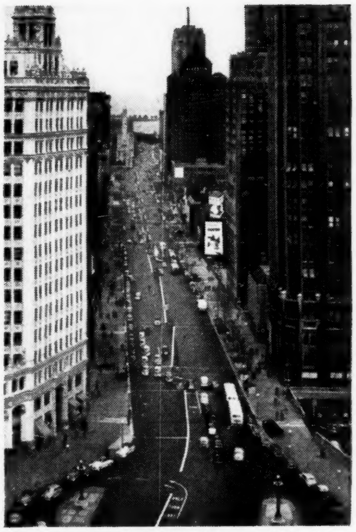
United Kingdom

626,512. **Wheels for Aircraft and Other Vehicles.** Dunlop Rubber Co., Ltd., and H. J. Butler.

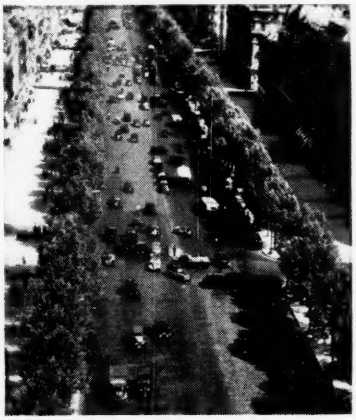
626,594. **Track Links for Endless Track Vehicles.** Dunlop Rubber Co., Ltd., and B. W. D. Lacey.

626,840. **Wheel Rims for Tractors and Like Vehicles.** Dunlop Rubber Co., Ltd., P. B. Chatterton, and J. H. Darling.

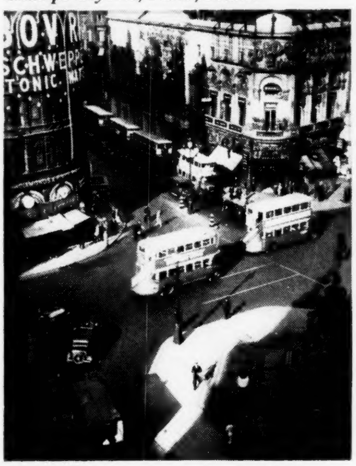
626,959. **Method of Prevention of Air Leaks and Preservation of Inner Tubes of Pneumatic Tires.** R. A. W. Tillman and B. V. Orre.



Michigan Boulevard—Chicago, Illinois



Champs Elysées, Paris, France



Picadilly Circus—London, England

Calco

Why do more people in the world ride on tires made with MBT and MBTS than tires made with all other accelerators combined?

You will find the answer by comparing quality and figuring your savings per 100 pounds of rubber hydrocarbon.

AMERICAN *Cyanamid* COMPANY

CALCO CHEMICAL DIVISION
RUBBER CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY

SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby and Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N. J. • In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto

TRADE MARKS

United States

443,009. **Elastron.** Wide webbing. Industrial Synthetics Corp., Irvington, N. J.

443,020. **Avtrim.** Sheet material. B. F. Goodrich Co., New York, N. Y.

443,036. **Plastikool.** Crib sheets. International Latex Corp., Dover, Del.

443,037. **Apex.** Tires Affiliated Retailers, Inc., New York, N. Y.

443,054. Representation of a circle containing the words: **"Protex Film Plastics."** and on the outside of which are the words: **"Another Product."** Cap protectors, shoulder covers, shower caps, etc. Protex Products Co., Jersey City, N. J.

443,137. **Jog-Alongs.** Footwear. G. R. Kinney Co., Inc., New York, N. Y.

509,643. **Fulmold.** Brake lining and clutch facing. Asbestos Mfg. Co., Huntington, Ind.

509,653. **Maraprene.** Lignin reinforced rubber. Marathon Corp., Rothschild, Wis.

509,659. **Sure-Hold.** Adhesively coated cloth and paper. Nashua Gummed & Coated Paper Co., Nashua, N. H.

509,678. Representation of a circle containing the letters: **"DW."** Plastic molding powders and liquid plastic compounds and doughs. Dussi-Wallace & Co., New York.

509,702. **Ruby.** Erasers and rubber bands. Eberhard Faber Pencil Co., Brooklyn, N. Y.

509,732. **Koylon.** Auto seat cushions. United States Rubber Co., New York, N. Y.

509,763. **Plastiroll.** Ink rolls. Markem Machine Co., Keene, N. H.

509,771. **XX.** Zinc oxide. New Jersey Zinc Co., New York, N. Y.

509,781. **Airstop.** Tires and tubes. Manufacture de Caoutchouc Michelin (Puiseux, Boulanger & Cie.), Clermont-Ferrand (Puy de Dome), France.

509,793. **Slip-Not.** Transmission belting. Slip-Not Belting Corp., Kingsport, Tenn.

509,842. **Warner "Dreadnaught."** Cables. Warner Electric Brake Mfg. Co., South Beloit, Ill.

509,845. **Pancofilm.** Artificial leather. Pancofilm, Inc., Chelsea, Mass.

509,878. **Westmole.** Coated and waterproofed cloth. Joanna Western Mills Co., Chicago, Ill.

509,879. **Lacqroid.** Coated and waterproofed cloth. Joanna Western Mills Co., Chicago, Ill.

509,945. **Wonda Wash.** Shower curtains. House Beautiful Curtains, Inc., New York.

509,960. **"Kitchen-Tyme."** Window and shower curtains. Sadwin Curtain Mfg. Co., Inc., Woonsocket, R. I.

510,019. **Kotol.** Solvent solutions for protective coatings. United States Rubber Co., New York, N. Y.

510,021. **Sun Valley.** Footwear. Sun Valley Boots, Inc., Malone, N. Y.

510,033. **Customfit.** Suspenders. Pioneer Suspender Co., Philadelphia, Pa.

510,037 **Big and Little Sister.** Footwear. Reider Shoe Mfg. Co., Inc., Schuylkill Haven, Pa.

510,148. **America's Famous Clothes.** Raincoats. Brooks Clothes, Inc., Baltimore, Md.

510,156. Representation of a girl and the words: **"Kant Roll."** Girdles. True Form Corset Co., Inc., Philadelphia, Pa.

510,163. Representation of a geometric figure. Adhesive tapes. Industrial Tape Corp., New Brunswick, N. J.

510,192. **Screwballs.** Balls for use on flour sifting screens. R. J. S. Carter, Minneapolis.

510,205. **Hydraulic.** Golf balls. Worthington Ball Co., Elyria, O.

510,256. Representation of an arrow cut by the words: **"Red Arrow."** Athletic balls. Sun Rubber Co., Barberton, O.

510,257. Representation of an arrow cut by the words: **"Blue Arrow."** Athletic balls. Sun Rubber Co., Barberton, O.

510,258. Representation of an arrow cut by the words: **"Gold arrow."** Athletic balls. Sun Rubber Co., Barberton, O.

510,267. **Voit.** Athletic balls. W. J. Voit Rubber Corp., Los Angeles, Calif.

510,315. **O 5.** Footballs. A. G. Spalding & Bros., Inc., Chicopee, Mass.

510,316. Representation of a label containing the words: **"The Sign of Quality"** and **"Reach."** Athletic balls. A. G. Spalding & Bros., Inc., Chicopee, Mass.

510,317. **Birdie.** Golf balls. A. G. Spalding & Bros., Inc., Chicopee, Mass.

510,318 **Victor.** Golf balls. A. G. Spalding & Bros., Inc., Chicopee, Mass.

510,319. **Fast Play.** Athletic balls. A. G. Spalding & Bros., Inc., Chicopee, Mass.

510,322. **Dura-Latex.** Foam rubber. Century Fabrics Co., Inc., Chicago, Ill.

510,326. Representation of an airplane and the words: **"Fast-Flite."** Athletic balls. A. G. Spalding & Bros., Inc., Chicopee, Mass.

510,331. Representation of a piece of belting containing two moose heads and the words: **"Innerlocked Products."** Belting. Imperial Belting Co., Chicago, Ill.

510,380. **Koylon.** Foam rubber for cushions. United States Rubber Co., New York, N. Y.

510,423. **HI-IO-SL.** Belting. Quaker Rubber Corp., Philadelphia, Pa.

510,424. **Wheatland.** Belting. Quaker Rubber Corp., Philadelphia, Pa.

510,450. **Dowex.** Ion exchange resins. Dow Chemical Co., Midland, Mich.

510,470. **Master-Fit.** Flush tank balls. American Rubber Products Corp., New York, N. Y.

510,475. **Seal Rite.** Flush tank balls. Scully Rubber Mfg. Co., Baltimore, Md.

510,498. **Resinal.** Coated abrasives. Behr-Manning Corp., Troy, N. Y.

510,536. **Verticol.** Impregnating or filling compounds for cables. The Okonite-Callender Cable Co., Inc., Paterson, N. J.

510,655. **Thermoscent.** Odor masks. Fritzsche Bros., Inc., New York, N. Y.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, July, June 1949; First Seven Months, 1949, 1948

	July, 1949	% of Change from Preceding Month	June, 1949	First Seven Months, 1949	First Seven Months, 1948
Passenger Casings					
Shipments					
Original equipment	2,802,898		2,927,512	16,140,871	12,095,824
Replacement	3,957,863		3,635,495	21,640,893	24,827,142
Export	34,756		35,547	270,982	381,353
TOTAL	6,795,517	+ 2.99	6,598,518	38,052,746	37,304,319
Production	5,507,334	−14.89	6,470,724	38,814,301	40,128,154
Inventory end of month	9,335,979	−12.08	10,618,442	9,335,979	8,253,829
Truck and Bus Casings					
Shipments					
Original equipment	295,253		306,662	2,337,445	3,271,880
Replacement	529,953		549,942	3,745,487	4,435,870
Export	73,255		80,117	581,544	686,771
TOTAL	898,461	− 4.09	936,721	6,664,476	8,394,521
Production	756,342	−17.89	921,143	7,099,154	8,799,102
Inventory end of month	2,380,776	− 5.35	2,515,374	2,380,776	1,952,751
Total Automotive Casings					
Shipments					
Original equipment	3,098,151		3,234,174	18,478,316	15,367,704
Replacement	4,487,816		4,185,401	25,386,380	29,263,012
Export	108,011		115,664	852,526	1,068,124
TOTAL	7,693,978	+ 2.11	7,535,239	44,717,222	45,698,840
Production	6,263,676	−15.26	7,391,867	45,913,455	48,927,256
Inventory end of month	11,716,755	−10.79	13,133,816	11,716,755	10,206,580
Passenger and Bus and Truck Tubes					
Shipments					
Original equipment	3,107,225		3,230,789	18,464,174	15,365,480
Replacement	3,127,447		3,106,247	18,873,678	23,447,303
Export	64,930		72,179	568,930	635,934
TOTAL	6,299,602	− 1.71	6,409,215	37,906,782	39,448,717
Production	5,230,075	−18.66	6,430,026	39,738,978	40,429,428
Inventory end of month	11,364,436	− 8.84	12,465,760	11,364,436	8,760,344

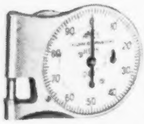
NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

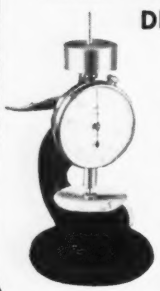
United States Rubber Statistics — June and First Half, 1949

(All Figures in Long Tons, Dry Weight)

	June, 1949						First Six Months, 1949				
	New Supply			Distribution		Month-End Stocks	New Supply			Distribution	
	Production	Imports	Total	Consumption	Exports		Production	Imports	Total	Consumption	Exports
Natural rubber, total	0	49,038	49,038	44,239	471	95,404	0	324.203	324,203	273,497	2,929
Latex, total	0	2,180	2,180	2,878	0	8,222	0	12,742	12,742	17,188	0
Rubber and latex, total	0	51,218	51,218	47,117	471	103,626	0	336,945	336,945	290,685	2,929
Synthetic rubber, total	*28,248 †3,705	1,127	33,080	36,949	513	106,882	*186,683 †24,106	6,943	217,732	218,792	3,559
GR-S	*24,633 †487	910	26,030	28,865	91	89,414	*157,891 †2,080	6,163	166,134	170,346	946
Neoprene	†2,310	0	2,310	2,621	295	3,418	†16,398	0	16,398	16,291	1,648
Butyl	*3,615	217	3,832	4,992	5	10,992	*28,792	780	29,572	29,251	22
Nitrile	†908	0	908	471	122	3,058	†5,628	0	5,628	2,904	937
Natural rubber and latex, and synthetic rubber, total	31,953	52,345	84,298	84,066	984	210,508	210,789	343,888	554,677	509,477	6,488
Reclaimed rubber, total	18,849	0	18,849	19,316	694	30,684	113,498	0	113,498	112,539	5,708
GRAND TOTALS	50,802	52,345	103,147	103,382	1,678	241,192	324,287	343,888	668,175	622,016	12,196

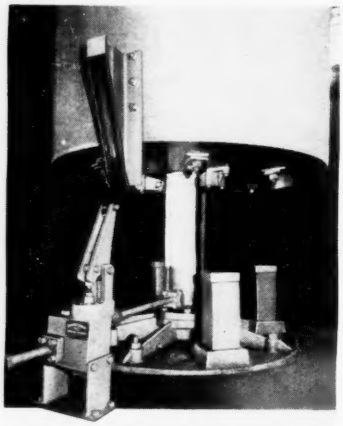
* Government plant production.
†Private plant production.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.





New Machines and Appliances

Accumulator Safety Valve



Protectomatic Valve in Use on Weighted Accumulator Tank

THE Protectomatic valve, a new high-pressure hydraulic throttle-type valve for use on weighted-type accumulators, has been developed by R. D. Wood Co., Public Ledger Bld., Philadelphia 5, Pa. In addition to providing a simple and positive means of controlling the falling speed of the accumulator, the valve also acts as a protective device to prevent the accumulator tank or platform from crashing on its bumper blocks.

Designed to operate from 1,500 to 5,000 p.s.i. working pressure, the valve is of rugged construction throughout, with bodies machined from solid forged-steel blocks, and has bronze bushings and stainless-steel sliding plunger, seat, and spindle. Operating is automatic; the valve is controlled by a lever equipped with a roller that contacts a cam attached to the accumulator tank. The valve begins to retard the descent of the tank at a point approximately two feet above the bumper blocks, and stops the descent completely at a height of one inch to two inches above the blocks.

Press Control Unit

A NEWLY developed Model No. 140-X Robotron control unit, designed to perform automatic bumping (breathing) operations on hydraulic presses, has been announced by Emmett Machine & Mfg., Inc., Akron 14, O. The unit can be set to give from one to 40 bumps during any one cycle of operation, as well as to control the overall cure time. The control is equipped with three built-in time arrangements and is wired for use with limit switches to regulate the amount of press opening during the bumping operations, to close the press after a predetermined time, and to hold the press closed until the next bump. The Robotron provides a range of 21 different cure times for each

SEE PAGE 4

Need faster acceleration?

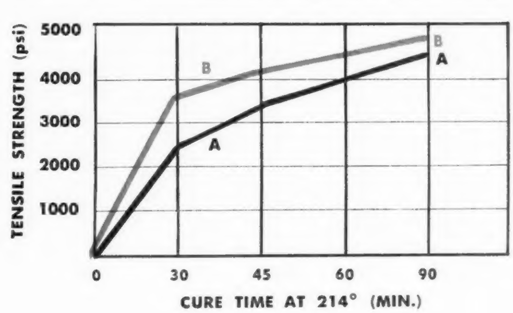
ULTEX*

AN ULTRA ACCELERATOR . . .

When looking for fast acceleration consider Ultex, the multiple use accelerator. Rapid and efficient in natural rubber both as a primary and secondary accelerator. Excellent with reclaims and GR-S with safe processing.

TEST RECIPE

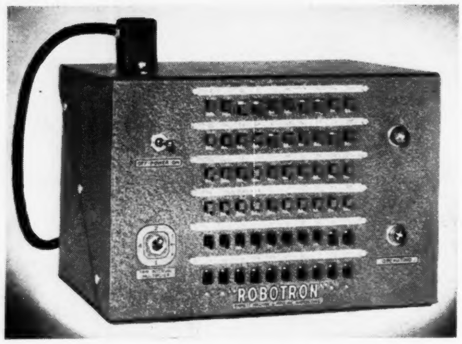
COMPOUND	A	B
SMOKED SHEETS	100.0	100.0
ZINC OXIDE	10.0	10.0
SULPHUR	2.0	2.0
STEARIC ACID	1.0	1.0
ULTEX	**0.5**	**0.75**



The C. P. Hall Co.
CHEMICAL MANUFACTURERS

*Manufactured by CHEMICO, INC.
THE C. P. HALL CO., Manufacturers Agents

AKRON, OHIO • LOS ANGELES, CALIFORNIA • CHICAGO, ILLINOIS • SAN FRANCISCO, CALIFORNIA

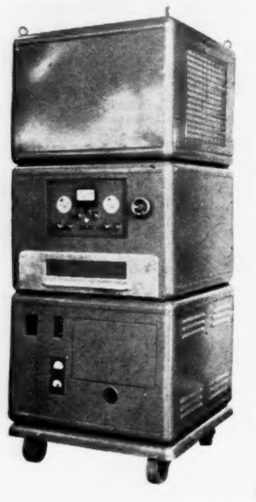


Model No. 140-X Robotron Control Unit for Presses

setting of the time range switch, and bumps can be timed to be either alternating or consecutive, as required.

The new unit is recommended for processes where changes of cycles or molds are common and where complex bumping combinations are necessary. Push buttons provide instant control of press operations, and, once set, the press will continue through the cycle without additional attention. An accessory attachment is available for locking the unit after setting to prevent tampering. Shock mounting is provided for extra protection, and timing arrangements can be furnished for any cycle of operation and for the length of cure.

New Dielectric Heater



Model 15R Thermex Red Head Dielectric Heater

A NEW high level of efficiency in preheating large rubber and plastic preforms is claimed for the new Model 15R Thermex Red Head high-frequency dielectric heating unit, made by Thermex Division, Girdler Corp., Louisville, Ky. The new unit is engineered for peak performance from 70 to 250° F. in one minute, and larger loads can be similarly heated in slightly longer cycles. The famous Thermex sliding tray which handles preforms up to 6 by 23 by 26 inches is particularly useful.

Of all-steel construction, copper plated where required, and totally enclosed, the heater occupies a floor area of only 37 by 37 inches and is fully portable and air cooled. The oscillator, preheater, and rectifier sections are contained in individual cabinets, rigidly mounted one upon the other. The unit operates on either 230 or 440 volts, and the preheater section has a control panel with plate current meter, timer, start and stop buttons, and terminals for connecting remote control stations. A convenient hand-wheel on the cabinet permits quick adjustment of the height of the electrodes when dissimilar loads are to be heated. The new unit is certified to meet FCC regulations dealing with this type of equipment.

Tire Cord Mill for Australia

A new mill for the manufacture of tire cord and fabric is being erected at Bendigo, Victoria, by the Bradford Cotton Mills, Ltd. Machinery is arriving from England, and the new mill is expected to be in operation shortly. At first only cotton will be twisted, but later on rayon also will be handled. The new plant, whose estimated cost is between £250,000 and £300,000, is expected to make Australia independent of imports of cord and fabrics.

Make Your Rubber Products

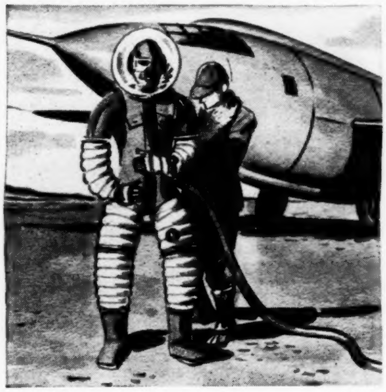
Better...Faster...For Less!

S/V SOVALOID C . . . This versatile, low-cost plasticizer is suitable for use with both rubber (Buna N) and vinyl resins. S/V Sovaloid C has high resistance to oil and aromatic solvents.

These proved
Socony-Vacuum plasticizers
and wax emulsions will improve
your processing operations
and lower your costs.

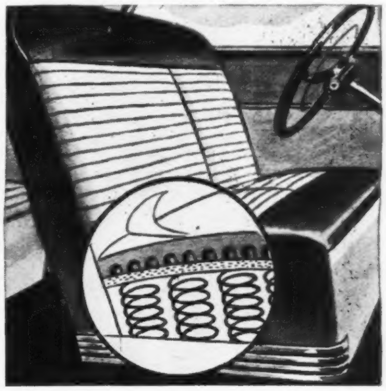
Back of them is
skilled technical service
to study your problems, assist
in correct applications,
and develop new products,
where they are needed.

S/V SOVALOID A SPECIAL . . . Here's a general-purpose, light processing oil for GR-S, Neoprene, natural rubber, and blends of GR-S and natural rubber. It has unusual light stability characteristics.



S/V SOVALOID L . . . If you are looking for a plasticizer to make Neoprene stay flexible at low temperatures, here is the answer to your problems. S/V Sovaloid L is ideal for this purpose.

S/V SOVALOIDS H, W and N . . . These are heavy processing oils for plasticizing natural rubber, GR-S and Neoprene. They have good milling characteristics and high dispersive properties.



S/V CEREMULS . . . These wax emulsions have proved their superiority in Neoprene sponge rubber as anti-tack agents. They also have proved their value in vinyl latices as anti-blocking agents.

SOCONY-VACUUM PROCESS PRODUCTS

Process Products
SOCONY-VACUUM

SOCONY-VACUUM OIL COMPANY, INC., 26 Broadway, New York 4, N.Y., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

FAR EAST

MALAYA

Report to the Planters' Association

At a meeting of the United Planting Association of Malaya held the end of April, Sir Sydney Palmer, retiring president, reviewing the events of the past year pointed to the gratifying fact that the government now had gained the upper hand in its campaign against banditry here. Terrorists, however, had not lost their power to intimidate labor, at least to the extent of forcing labor to steal rubber for them. Sir Sydney estimated that in the past year roughly 10% of the total crop had been stolen, a circumstance which brought from the *Straits Times* the editorial remark that, "Terrorism consequently takes double the direct taxation imposed by Government, approximately $68,000,000 worth of rubber for the bandits against $33,000,000 paid for taxes."

For the past three years, Sir Sydney declared, the Association had been pressing the government to take steps to stop rubber stealing and illicit tapping, and apparently the government is now finally preparing to introduce an emergency regulation.

Production in 1948, he went on, had been the highest ever attained. In 1948 world production had been 1,520,000 tons, of which Malaya produced the record amount of 698,189 tons. After dealing with the unsatisfactory rubber price, Sir Sydney discussed the 1949 meeting of the Rubber Study Group, which, to the disappointment of rubber growers, could not be held in Malaya as originally arranged. The Association had in the past made representations to the Malayan Government and through the Rubber Growers' Association, he said, pointing out the almost ludicrous position whereby the greatest rubber producing country in the world has no official representation at the Group meeting. The RGA had on several occasions appealed to the Colonial Office to have this anomaly corrected, but so far without success. The British colonial producers, who at present produced more than 50% of world production, had this year been represented by one official whose knowledge of rubber growing was necessarily theoretical, assisted by a team of advisers which, with one notable exception, consisted so far as this country was concerned of men, who had not had the advantage of dealing with the problems of the rubber producing industry at the highest levels.

"So long as this state of affairs exists," the speaker concluded, "we are well clear of the responsibilities of any results."

Discussing the rubber situation in his turn, the newly appointed vice president of the Association, J. S. Ferguson, declared that producers were giving their rubber away for a mere song and warned that neither the government nor the rubber industry could survive at present prices.

"We have become so accustomed to being browbeaten by our main consumer's synthetic baton that we have already almost accepted the negative result of the International Rubber Study Group as inevitable, and without surprise or resentment."

Lower costs, he went on, could only be attained by reorientation of estate units along with replacement of effete seedling rubber with high-yielding budgrafts, but under present circumstances very few could meet the costs.

A deputation headed by H. H. Facer, the new president of the United Planting Association of Malaya, and including seven other members representing all sections of the Malayan rubber producing industry, approached the High Commissioner to discuss the alarming state of the industry. It is reported that on this occasion a spokesman for the Malaya Estate Owners' Association stated that there appeared to be no further use in permitting the British Government and British interests to handle the rubber position. At all events, after a discussion lasting several hours the High Commissioner promised that the memorandum on the crisis of the rubber industry presented by the deputation would be sent to London for consideration at the highest level.

How to Combat Threat of Synthetic Rubber

Recent opinion expressed by or reported in the local press reveals an increased tendency to dispassionate weighing of the synthetic threat to Malayan rubber accompanied by a more positive approach to the search for a solution, at least in some quarters. Not that criticism of American rubber policy has diminished, but the attitude seems to lean toward finding constructive methods of meeting the situation involving a greater readiness to

consider various aspects of the American point of view and even to admit that it is justified in certain respects, for instance in regard to grading and packing natural rubber.

A colder appraisal of suggested remedies is also discernible; thus the full implications of extensive replanting with buddings to cut labor costs by greatly increased production, so often touted as a panacea for the ills of the plantation rubber industry, are drawing from thoughtful persons the questions: what to do with the vast quantities of rubber that must become available and what to do about the unemployment among tappers that must result from such a policy—if it could be carried out?

Inevitably the conclusion is then drawn that "mass" production of natural rubber to cut costs is not the proper solution—that that must instead be sought in new markets and new uses, and in the creation of new industries, other than rubber. But it is questionable to what extent the general run of rubber growers in the Far East, and especially the little man in Malaya and Ceylon, would be tempted to abandon, in favor of untried crops, one so lucrative in the past and relatively so simple to grow as rubber. News from Ceylon, for instance, indicates that uneconomic estates are in no hurry to avail themselves of the government's offer to buy up their land; perhaps, as in many instances in Malaya, it is too hard to give up entirely the hope that a restriction scheme will once more come to the rescue.

"New markets," means to many planters chiefly Russia and the countries behind the Iron Curtain.

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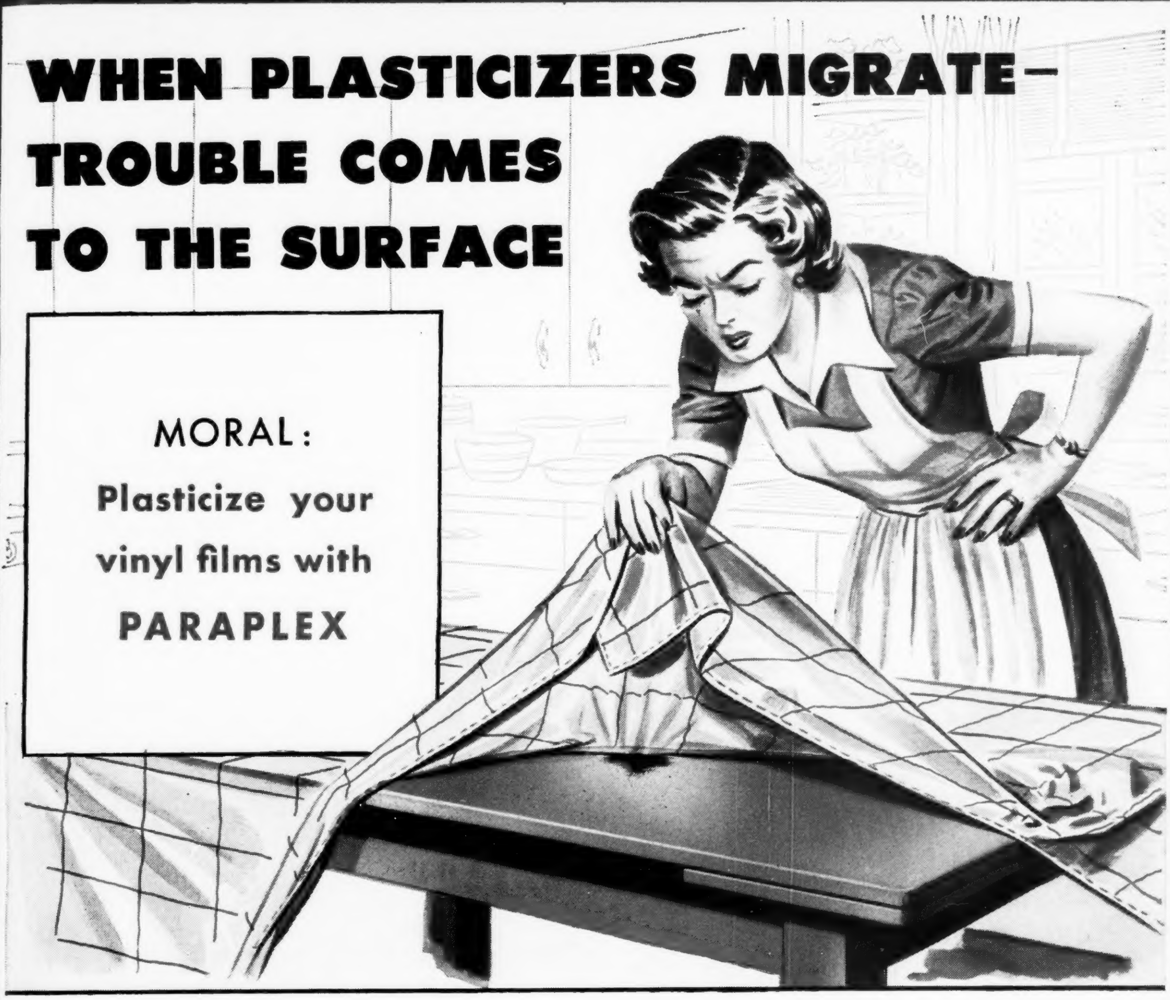

You can't keep fugitive plasticizers under cover. They migrate from one surface to another . . . volatilize and leave vinyl films stiff and brittle . . . rub off on clothing . . . *ruin furniture by sticking to varnish and lacquer, by actually removing the finish!*

The PARAPLEX plasticizers are your best insurance against migration. Once a part of vinyl compounds, they stay there—despite constant rubbing, high heat, and prolonged contact with varnished or lacquered surfaces and baked finishes. They are your guarantee of permanent plasticization—of permanent customer satisfaction.

PARAPLEX G-50 is the polymeric plasticizer at a monomeric price. Its resistance to migration, volatilization, and extraction brings long life to free and supported film, to molded and extruded vinyl compounds. It processes readily and has unexcelled pigment wetting and grinding properties.

And PARAPLEX G-25 is the ultimate in plasticizing permanence. A high molecular weight polymer, it does not spew or migrate even at high temperatures. Its volatility is essentially zero; its resistance to heat and ultraviolet light, outstanding. Its extractability by oil, water, and cleaning fluids is extremely low. Long after monomeric plasticizers have fled from vinyl compounds, leaving them cracked, crazed, and embrittled, compounds plasticized with PARAPLEX G-25 *retain their initial flexibility.*

PARAPLEX *is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.*

Write to Department IR-2 for technical literature describing PARAPLEX G-25 and PARAPLEX G-50.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square Philadelphia 5, Pa.

The Resinous Products Division was formerly The Resinous Products & Chemical Company

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CEYLON

Government to Buy Uneconomic Rubber Land

A recommendation by the Ceylon Minister for Agriculture and Lands that the government buy up uneconomic rubber land in the island at 200 rupees per acre has been accepted by the Cabinet. In the next financial year, accordingly, the government will begin to purchase such uneconomic rubber lands as are suitable for purposes of reafforestation or for village expansion. For the present, at least, uneconomic rubber lands not coming under these two categories will not be bought. There will be no compulsory acquisition. Owners of uneconomic rubber lands are expected to offer the land to the government at 200 rupees per acre, who will only buy if the land is considered desirable for the purposes mentioned.

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RECIPE

from the Barrett Rubber Research Laboratory

FOR

CUMAR*

RESIN, MH 2½ GRADE,

in Natural Rubber

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RECIPE

Smoked Sheets	100.0	90.0
CUMAR* Resin, MH 2½ grade	....	10.0
Calcium Carbonate (Precipitated)	75.0	75.0
Zinc Oxide	5.0	5.0
Stearic Acid	2.0	2.0
"AMINOX"	1.0	1.0
Sulfur	3.0	3.0
Benzothiazyl Disulfide	1.0	1.0
Total	**187.0**	**187.0**
Specific Gravity	1.31	1.33
Rubber Hydrocarbon, % by weight	53.5	48.2
Rubber Hydrocarbon, % by volume	76.0	69.5
Mooney Viscosity, ML, 4 min. @ 212 F.	10	19

Mooney Scorch, ML, 250 F.

Minutes	Viscosity	
1	10	17
5	8	13
10	8	12
15	11	13
20	65	14

Press Cure @ 307 F. (60 lb.) — 10 minutes

	Unaged	Aged 14 Days @ 70 C.	Unaged	Aged 14 Days @ 70 C.
Tension and Hardness Data				
Stress, 300%, psi.	600	850	500	750
Stress, 500%, psi.	1600	2200	1500	2050
Tensile, psi.	3250	2600	3300	3100
Elongation, %	680	550	730	630
Permanent Set, %	26	19	34	33
Hardness, Shore A.	50	56	46	52
Tear Resistance, Angle, Pounds per One Inch Thickness	215	200	250	245
Press Cure @ 307 F. (60 lb.) — 15 minutes				
Abrasion Resistance, DuPont	....	480	....	470
Compression Set, 40% Constant Deflection, %	26.8	....	27.3	....
Resilience, Yerzley, %	86.0	92.5	80.5	88.0
Rebound, Goodyear-Healey, %	73.5	81.1	72.3	78.7

*Reg. U. S. Pat. Off.

Barrett*

THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

A second resolution was adopted requesting the Minister for Labor & Social Services to exempt the industry from the operation of the Minimum Wages Ordinance as a temporary measure.

Approached in the matter of the first resolution, the Minister of Trade & Commerce informed the Association that such an agreement as envisaged was not feasible at the moment.

On the other hand the government did release rubber estates from the Wages Board Ordinance with the result that soon afterward rubber workers staged a token strike and a week later threatened a new strike in which they were to be joined by tea estate workers.

The government's view of the rubber situation in Ceylon was set forth in a rather lengthy statement, the gist of which was that Ceylon growers must find ways to cut production costs to a level below current prices if they are to survive. Ceylon's disadvantages in regard to climate, soil, and its backwardness in the matter of budding are surveyed, and the very realistic opinion is expressed that there is no future for inefficient producers. The following paragraph is particularly significant:

"The future of the rubber industry is unpredictable, but many experts are of the opinion that it will become, on the one hand, a smallholders' industry in which the owner provides his own labor, and, on the other, a highly integrated and organized industry with large units of 10,000 acres or more producing yields equivalent to the best now obtained from budded rubber."

Russia Wants Rubber from Ceylon

Russia is making another bid for Ceylon rubber. A representative from the Soviet Trade Commissioner's Office in London is understood to be planning to visit Colombo shortly to explore the possibilities of Russian purchases of Ceylon rubber. It will be recalled that last year Russia offered to buy Ceylon's entire 1949 output of rubber on a government-to-government trading basis, but the deal was rejected. Early this year a member of the Soviet Embassy in Calcutta went to Colombo to negotiate a barter agreement whereby Russia would supply wheat, sugar, and other commodities in exchange for Ceylon produce including tea and rubber. These efforts also failed. The Ceylon Minister for Trade & Commerce stated that Ceylon was ready to sell Russia or any country rubber if there was a firm offer at a price above the ruling market price. It is not known how official the visit of the Soviet envoy from London is; in any case in view of the uneasy position of the Ceylon rubber industry, there is a possibility that the Russian bid this time may meet more success than in the past.

Aid Asked for New Rubber-Based Products

A Ceylonese claims to have invented a process by which he can produce superior wood-preservatives, insecticides, varnishes, paint thinners, and paints, with rubber as the base, at half the price of similar imported materials. The manufacture of the new products is said to have passed the experimental stage, and the government is now asked to investigate the claims made and, if satisfied that they are justified, to give suitable aid to promote their large-scale manufacture.

consider various aspects of the American point of view and even to admit that it is justified in certain respects, for instance in regard to grading and packing natural rubber.

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Calcium Carbonate (Precipitated)	75.0	75.0
Zinc Oxide	5.0	5.0
Stearic Acid	2.0	2.0
"AMINOX"	1.0	1.0
Sulfur	3.0	3.0
Benzothiazyl Disulfide	1.0	1.0
Total	**187.0**	**187.0**
Specific Gravity	1.31	1.33
Rubber Hydrocarbon, % by weight	53.5	48.2
Rubber Hydrocarbon, % by volume	76.0	69.5
Mooney Viscosity, ML, 4 min. @ 212 F.	10	19

Mooney Scorch, ML, 250 F.

Minutes	**Viscosity**	
1	10	17
5	8	13
10	8	12
15	11	13
20	65	14

Press Cure @ 307 F. (60 lb.) — 10 minutes

	Unaged	**Aged 14 Days @ 70 C.**	**Unaged**	**Aged 14 Days @ 70 C.**
Tension and Hardness Data				
Stress, 300%, psi.	600	850	500	750
Stress, 500%, psi.	1600	2200	1500	2050
Tensile, psi.	3250	2600	3300	3100
Elongation, %	680	550	730	630
Permanent Set, %	26	19	34	33
Hardness, Shore A.	50	56	46	52
Tear Resistance, Angle, Pounds per One Inch Thickness	215	200	250	245
Press Cure @ 307 F. (60 lb.) — 15 minutes				
Abrasion Resistance, DuPont*	....	480	....	470
Compression Set, 40% Constant Deflection, %	26.8	....	27.3	....
Resilience, Yerzley, %	86.0	92.5	80.5	88.0
Rebound, Goodyear-Healey, %	73.5	81.1	72.3	78.7

*Reg. U. S. Pat. Off.

THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

A second resolution was adopted requesting the Minister for Labor & Social Services to exempt the industry from the operation of the Minimum Wages Ordinance as a temporary measure.

Approached in the matter of the first resolution, the Minister of Trade & Commerce informed the Association that such an agreement as envisaged was not feasible at the moment.

On the other hand the government did release rubber estates from the Wages Board Ordinance with the result that soon afterward rubber workers staged a token strike and a week later threatened a new strike in which they were to be joined by tea estate workers.

The government's view of the rubber situation in Ceylon was set forth in a rather lengthy statement, the gist of which was that Ceylon growers must find ways to cut production costs to a level below current prices if they are to survive. Ceylon's disadvantages in regard to climate, soil, and its backwardness in the matter of budding are surveyed, and the very realistic opinion is expressed that there is no future for inefficient producers. The following paragraph is particularly significant:

"The future of the rubber industry is unpredictable, but many experts are of the opinion that it will become, on the one hand, a smallholders' industry in which the owner provides his own labor, and, on the other, a highly integrated and organized industry with large units of 10,000 acres or more producing yields equivalent to the best now obtained from budded rubber."

Russia Wants Rubber from Ceylon

Russia is making another bid for Ceylon rubber. A representative from the Soviet Trade Commissioner's Office in London is understood to be planning to visit Colombo shortly to explore the possibilities of Russian purchases of Ceylon rubber. It will be recalled that last year Russia offered to buy Ceylon's entire 1949 output of rubber on a government-to-government trading basis, but the deal was rejected. Early this year a member of the Soviet Embassy in Calcutta went to Colombo to negotiate a barter agreement whereby Russia would supply wheat, sugar, and other commodities in exchange for Ceylon produce including tea and rubber. These efforts also failed. The Ceylon Minister for Trade & Commerce stated that Ceylon was ready to sell Russia or any country rubber if there was a firm offer at a price above the ruling market price. It is not known how official the visit of the Soviet envoy from London is; in any case in view of the uneasy position of the Ceylon rubber industry, there is a possibility that the Russian bid this time may meet more success than in the past.

Aid Asked for New Rubber-Based Products

A Ceylonese claims to have invented a process by which he can produce superior wood-preservatives, insecticides, varnishes, paint thinners, and paints, with rubber as the base, at half the price of similar imported materials. The manufacture of the new products is said to have passed the experimental stage, and the government is now asked to investigate the claims made and, if satisfied that they are justified, to give suitable aid to promote their large-scale manufacture.

INDIA

Much concerning the rubber manufacturing industry in India is revealed in two new publications from India. The first is the *I. & S. Bulletin* of the Ministry of Industry and Supply, issued quarterly by the Publications Division of the Ministry of Information and Broadcasting, Delhi. From a report on rubber covering the third quarter of 1948, it appears that the government has been registering all rubber estates, and that to the end of September, 1948, the number of estates registered totaled 10,869 with a combined planted area of 153,403 acres. Apparently much interest now exists in new planting in India, for during the quarter under review 18 new licences for an area of 12,538 acres were issued, making a total of 101 licenses for the first nine months of the year.

India's output of raw rubber is not sufficient to meet the needs of her growing industry, and in the first nine months of 1948, import licences for 4,805 tons of rubber were recommended.

A new Development Committee of Miscellaneous Rubber Goods formed of technical experts has replaced the former committee. At a recent meeting of this body, many problems were discussed. It was disclosed that since all surgical rubber goods factories had gone to Pakistan, India now must import this type of goods. Certain manufacturers, however, are to undertake the manufacture of articles like catheters, stomach tubes, hot water bottles, etc., and statistical data on requirements are being collected for their guidance.

All belting and first-grade ebonite still have to be imported; home requirements of battery containers and cycle tires could be only partly met by local manufacturers. Annual output of battery containers is about 168,000 units, against requirements of 250,000 units; demand for cycle tires is 5,500,000 units; whereas local production supplies only 4,500,000 units. If necessary equipment is obtained, cycle tire production could be stepped up to 7,100,000 units annually.

Attempts are to be made to standardize important products, and manufacturers have also been asked to install simple testing machines to test manufactured goods. The establishment of a Rubber Technological Institute to train experts, suggest improvements, and test samples is also under consideration.

The report closes with production figures of tires and tubes for the 12 months, September, 1947-August, 1948, inclusive, and estimates for September, 1948. Totals for the 12-month period indicate output of 504,576 truck and bus tires and 454,207 tubes; 289,801 passenger-car tires and 358,554 tubes; 3,344,500 cycle tires and 4,464,392 tubes.

The second publication, called *Rubber India*, is the new official organ of the Indian Rubber Industries Association, formed in April, 1945, to represent manufacturers of general rubber goods. It now has a membership of 100 Indian manufacturers. An editorial states that barring tire manufacturers, the Indian rubber industry is composed of medium and small-scale manufacturers of general rubber goods, most of whom are Indians. Consumption of rubber by tire manufacturers is about 13,000-14,000 tons annually; manufacturers of general rubber goods consume barely 6,000-7,000 tons annually. The manufacture of the latter type of goods may be said to have been a war baby, developed practically overnight to meet an emergency, consequently factories are not properly equipped, and the industry lacks organization and rationalized production. Fear exists that the purely Indian industry may be wiped out if powerful foreign interests establish their plants in India.

At present the industry is further handicapped by the high price fixed by the government for rubber, which is about 50% above that in other rubber countries. IRIA includes a technical group committee, which has been working on a scheme for setting up a central laboratory, and a technical group, which meets periodically when lectures and papers are presented by prominent technicians of the industry. There is also a special latex group representing the very small-scale manufacturer who specializes in dipped goods.

In this connection it is to be noted that in India latex dipping is actually a cottage industry, that can be started with a very small capital and managed by individuals without much technical skill. Toy balloons seem to be the easiest item to manufacture, and nearly 200 factories in India are wholly or partly engaged in this business. During the last three years, the editor says, India had practically a monopoly of balloon manufacture, which it has since lost. IRIA, however, is introducing a standardization scheme and is taking steps to develop an export market for Indian balloons. He adds that Indian balloon factories are said to be in a position to produce up to 10,000,000 rupees worth of toy balloons for export.

According to a report from New Delhi, the Indian Rubber Board at a meeting in Bangalore approved a 20-year plan for the development of rubber plantations in the Dominion. It is expected that this will involve the expenditure of 80,000,000 rupees.

Editor's Book Table

BOOK REVIEWS

"Monomers, Section I: A Collection of Data and Procedures on the Basic Materials for the Synthesis of Fibers, Plastics, and Rubbers." Edited by E. R. Blout, H. Mark, and W. P. Hohenstein. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, looseleaf, 6½ by 9½ inches, 343 pages. Price, $7.50.

This compilation brings together in one place much of the data on properties, production processes, reactions, etc., of monomers previously appearing in widely scattered form throughout the literature. This section comprises eight pamphlets covering production, purification, analysis, handling, physical and chemical properties, reactions, and polymerization of acrylonitrile, butadiene, isobutylene, isoprene, styrene, methyl methacrylate, vinyl acetate, and vinyl chloride. Chapters on acrylate and methacrylate esters, and acrylic acid are in preparation; while material on other monomers and additions to the present collection will be published as necessary.

Although production methods are discussed in detail, in several cases current methods are not described. Other failings include the use of relatively few late references, and rather brief discussions of chemical reactions and polymerization methods. The sections on physical properties are quite comprehensive, however, and the book will be of value as a source of data on properties and behavior of monomers.

"Rubber Red Book." 1949 Edition, Seventh Issue. Published by *The Rubber Age*, 250 W. 57th St., New York 19, N. Y. Cloth, 6 by 9 inches, 924 pages. Price $5.

Continuing the expansion in size of the previous editions, this issue of the Red Book shows a total increase in number of pages, including advertisements, of 88 over the sixth issue. This increase in total pages is reflected by corresponding increases in the different sections of the book, particularly in the number of rubber manufacturers. The organization and classification system remains the same, except for the inclusion of a new section on educational courses in rubber chemistry and technology.

The directory includes sections on rubber manufacturers in the United States and Canada, rubber machinery and equipment, accessories and fittings, rubber chemicals and compounding ingredients, fabrics and textiles, natural rubber and related materials, synthetic rubbers and other rubber-like materials, reclaimed rubber, scrap rubber dealers, rubber latex, rubber derivatives, miscellaneous products and services, consulting technologists, branch offices and sales agents, trade and technical organizations, the new section on educational courses, technical journals, and a who's who in the rubber industry. Both subject and advertisers indices are appended.

"Plastics in Engineering." John Delmonte. Penton Publishing Co., Penton Bldg., Cleveland 13, O. Cloth, 6 by 9 inches, 654 pages. Price, $10.

This third edition of what has become a standard textbook on plastics engineering has been extensively revised, and a great deal of new information included on recent developments. The chapters follow a pattern of materials, properties, methods, and applications, with emphasis on engineering data. The technical data are organized to permit easy reference, and the use of numerous diagrams, photographs, tables, and other figures adds greatly to the clarity of the text and the value of the book.

Chapter headings include an introduction to organic plastics; types, characteristics, and preparation of organic plastics; effects of fillers upon the properties of molded plastics; physical properties of plastic materials; thermal properties; electrical properties; chemical properties; optical properties of transparent plastics; design principles for molded plastic parts; inserts for molded plastics; characteristics and preparation of molding compounds; compression and transfer molding; injection molding; cold molding; design and construction of molds; laminated plastics; cast plastics; extrusion of plastics; non-metallic bearings and their uses; non-metallic gears and pinions; non-metallic cams, couplings, and clutches; engineering applications of plastics; engineering applications of transparent plastics; styling the machine with plastics; plastics fabricating and finishing; organic plastics in surface coatings; synthetic rubbers and rubber-like materials; common failures and defects in plastics materials; and comparative costs of plastics and molds. The usefulness of the book is further enhanced by the inclusion of a comprehensive 16-page subject index.

NEW PUBLICATIONS

"Genpol Polyester Resin A-20." General Tire & Rubber Co., Akron, O. September 12, 1949. 6 pages. Genpol Polyester Resin A-20, a new type of Polyester resin for casting and laminating applications, is described in this bulletin. Physical test data are given for combinations of the resin with varying amounts of styrene monomer. Extensive tabular data on catalysts and catalyst-promoter systems for use with Genpol A-20 are included, together with data on exothermic heat of reaction.

"U. S. Rubber Transmission Belting—Engineering and Installation Data." United States Rubber Co., Rockefeller Center, New York 20, N. Y. 28 pages. This illustrated catalog offers detailed data on the company's transmission belting. Information on design, engineering, and performance characteristics is given, along with data on belt selection, belt drive analysis, and tables on belt speeds, service factors, and related subjects.

"Synthetic Resins for Brake Linings." Bulletin No. 49-1. Varcum Chemical Corp., Niagara Falls, N. Y. 8 pages. Comparison charts showing the 20 Varcum phenolic resins for the brake lining and allied industries are offered to simplify the evaluation and selection of the resins for the manufacture of friction materials. Descriptions of the test methods used are also presented.

"Di-Tert-Butyl-Para-Cresol, Effectiveness as a Rubber Antioxidant." Bulletin No. C-9-115-2, July, 1949. Koppers Co., Inc., Pittsburgh, Pa. 6 pages. This bulletin offers results obtained by an independent testing organization comparing DBPC with five commercially used non-staining, non-discoloring antioxidants. Results show DBPC to be valuable as an antioxidant for white and light-colored rubber goods and to be effective in natural rubber and several synthetic rubbers.

"Tomorrow's Products Tested Today." South Florida Test Service, Miami, Fla. 8 pages. This folder covers the company's facilities for making accelerated exposure, weathering, and immersion tests to obtain data on aging of many types of materials and products. Research and engineering work in connection with the development of new materials and products is also available.

Publications of Indoil Chemical Co., 910 S. Michigan Ave., Chicago 80, Ill. **"Indonex Plasticizers with High Styrene Copolymers in GR-S and Natural Rubber Compounds."** Circular No. 13-36, July 30, 1949. 6 pages. **"Indonex Plasticizers in Low Cost Automotive Rubber Products."** Circular No. 13-37, July 31, 1949. 4 pages. Circular 13-36 presents formulations and test data on results obtained using Indonex 638½ with natural rubber in Marbon S, and with Marbon S in GR-S and natural rubber. Circular 13-37 gives formulas and properties of certain highly loaded low-cost compounds for automotive rubber products to meet SAE specifications.

"A Study of Philblack O Bound Rubber." Philblack Bulletin No. 17, July, 1949. Phillips Chemical Co., Akron 8, O. 4 pages. Results of gel or bound rubber tests reveal that Philblack O possesses high reinforcement in "cold rubber," natural rubber, GR-S, and GR-S-10, with Mooney viscosities in the same range as those of the five lesser reinforcing blacks tested.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. **"News—About Du Pont Rubber Chemicals."** August, 1949. 4 pages. This is the first issue of the monthly news bulletin after a lapse of almost 10 years; it contains notes on various rubber chemical products and related technical publications.

"Polyac as a Stiffening Agent for GR-I." BL-233. August 1, 1949. 8 pages. Data are presented on the effects of Polyac concentration, and mastication time and temperature as factors affecting the degree of stiffening of GR-I obtained with Polyac.

"Paracril AMS 3228-B Compound." Enjay Co., Inc., 15 W. 51st St., New York 19, N. Y. 2 pages. The formulation and properties of a Paracril 26NS90 compound are shown to meet the requirements of Aeronautical Material Specification 3228-B for a rubber compound having hot oil and coolant resistance, low swell, and hardness of 70±5.

"Raybestos-Manhattan Products for Petroleum." Booklet No. 6903. Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J. 16 pages. This illustrated booklet describes the company's rubber and asbestos products for the petroleum industry. Information on products and applications appears for such items as fueling hose, oil well drilling and loading hose, belts, brake blocks, packings, and gaskets.

"The Supervisor's Management Guide." Edited by M. Joseph Dooher and Vivienne Marquis. American Management Association, 330 W. 42nd St., New York 18, N. Y. 190 pages. Price: members, $3; non-members, $3.50. Prepared by 17 operating executives and specialists, this loose-leaf handbook is intended to assist supervisors, foremen, and other supervisory personnel to apply new developments in management methods for improving human relations in business. The 20 chapters cover basic principles of sound human relations; supervisory attitudes and practices and their effects on worker morale and productivity; the executive responsibility for developing morale; dealing with emotional problems on the job; the art of speaking effectively to employes; tests for determining competent supervisors and executives; and related subjects.

"Hercules Synthetic Resins." Hercules Powder Co., Inc., Wilmington, Md. 20 pages. This revised edition of the company's booklet on its resins offers data on the properties and applications of the different resins available for use in the manufacture of adhesives, protective coatings, floor tiles, asphalt compositions, and other products.

"Cutting Costs—Sustaining Volume. Recent Price Declines Make These Two Jobs Urgent." Ford, Bacon & Davis, Inc., 1518 Walnut St., Philadelphia, Pa. 12 pages. Publications of the Automobile Manufacturers Association, 320 New Center Bldg., Detroit 2, Mich.: **"The Automotive Industry Moves Ahead!** 1941-1948." 8 pages. **"Motor Truck Facts."** 1949 Edition. 56 pages." **Automobile Facts and Figures."** 29th Edition, 1949. 80 pages. **"How to do Business with the Quartermaster Corps."** Department of the Army, New York Quartermaster Purchasing Office, 111 E. 16th St., New York 3, N. Y. 16 pages. **"A Year Book of Railroad Information."** 1949 Edition. Eastern Railroad Presidents Conference, 143 Liberty St., New York 6, N. Y. 96 pages.

BIBLIOGRAPHY

Physical-Mechanical Properties of Vulcanized Rubber Containing Different Types of Rubber. M. Outa, *Anais assoc. quim. Brasil*, 6, 203 (1947).

Chlorostyrene Polymers with Butadiene. H. C. Jones, *Rubber Age (N. Y.)*, Sept., 1948, p. 735.

A Machine for Use in Buffing Strip Samples of Rubber Materials. C. K. Chatten, S. A. Eller, W. K. Gondek, *Rubber Age (N. Y.)*, Sept., 1948, p. 743.

Coagulant Deposition of Latices. I. H. B. Morris, R. F. Hinderer, *Rubber Age (N. Y.)*, Sept., 1948, p. 745.

Measurement of Hysteresis and Dynamic Elastic Modulus of Textile Yarns and Cords. G. Palandri, *Rubber Age (N. Y.)*, Oct., 1948, p. 45.

Comparison of Cements for Bonding Nitrile Rubber to Steel. R. E. Morris, J. W. Hollister, P. A. Mallard, *Rubber Age (N. Y.)*, Oct., 1948, p. 53.

Stability of Accelerators as Affected by High Processing Temperatures. F. L. Holbrook, T. H. Fitzgerald, *Rubber Age (N. Y.)* Oct., 1948, p. 57.

Drying and Curing of Carpet Backing Compounds. *Rubber Age (N. Y.)*, Oct., 1948, p. 61.

Elastomers. H. L. Fisher, *Ind. Eng. Chem.*, Oct., 1948, p. 1788.

Plastics. G. M. Kline, *Ind. Eng. Chem.*, Oct., 1948, p. 1804.

Hard Rubber. F. S. Malm, *Ind. Eng. Chem.*, Oct., 1948, p. 1809.

Commercial Chemical Development of Butadiene. J. H. Boyd, *Ind. Eng. Chem.*, Oct., 1948, p. 1964.

Accelerated Aging of Neoprene Compounds. Effect of Copper. L. R. Mayo, R. S. Griffin, W. N. Keen, *Ind. Eng. Chem.*, Oct., 1948, p. 1977.

Chromatographic Analysis. G. F. Bloomfield, *Rubber Chem. Tech.*, July, 1948, p. 735.

The Application of Flow-Birefringence Measurements to High-Polymer Solutions. M. Wales. *J. Phys. & Colloid Chem.*, 52, 976 (1948).

Test Sets for Dielectric Faults in Coaxial Cable. J. W. Kittner. *Bell Labs. Record*, Oct., 1948, p. 416.

Effect of Heat on Chain-Type Polymers. I-II. K. Kanamaru, N. Damon, N. Ohno, *J. Soc. Chem. Ind. (Japan)*, 46, 1277 (1943). **III-IV.** K. Kanamaru, Y. Kawada, *Ibid.*, 47, 714 (1944).

Relation between the Distribution Function of Polymerization Degree and the Mechanical Properties of Chain-Form Polymers. K. Kanamaru, F. Oyama, *J. Soc. Chem. Ind. (Japan)*, 46, 1273 (1943).

Physical and Chemical Tests of Latex in the Laboratory. M. Boucher, *Rev. gen. caoutchouc*, 25, 8, 306 (1948).

Statistics and Tests. Lapadu-Hargues, *Rev. gén. caoutchouc*, 25, 8, 311 (1948).

Control in the Factory in the Course of Manufacturing. A. Beke, *Rev. gén. caoutchouc*, 25, 8, 317 (1948).

Two Experiments with Double-Budded *Hevea* Trees. F. W. Ostendorf, *Arch. Rubbercult.*, Apr., 1948, p. 1.

Selection of *Hevea* and Its Effect upon the Yield of Estate Plantations. J. G. J. A. Maas, *Arch. Rubbercult*, Apr., 1948, p. 19.

Simple Method and Apparatus for Investigating the Flow Processes of Very Viscous Fluids. H. Willenberg, W. Fritz, *Angew. Chem.*, 20, 5/6, 134 (1948).

On the Similarity of the Elastic and Dielectric Properties of Rubber Polymerizates. H. Roelig, Heidemann, *Kunststoffe*, 38, 7, 125 (1948).

Color Reactions of Current Accelerators. W. Schaeffer, *Kautschuk u. Gummi*, 1, 6, 149 (1948).

Nomograph for Determination of the Softness Factor of Rubber. H. M. Leeper, D. S. Davis, *Chem. Industries*, Sept., 1948, p. 498.

Tire Fires. How to Prevent and Extinguish Them. G. M. Sprowls, *TBA News*, Sept., 1948, p. 16.

Rubber Research, Rubber Investigations and Rubber Empiricism (Third Foundation Lecture). W. J. S. Naunton, *Trans. Inst. Rubber Ind.*, June, 1948, p. 10.

Vinyl Compounding Requires Thorough Mixing. Paraplex G-50 Serves as Pigment Grinding Medium. *Resinous Reptr.*, Sept., 1948, p. 14.

British Made Carbon Black—with Special Reference to the Manufacture of "Seval." C. L. Taylor, *Rubber Age (London)*, Oct., 1948, p. 279.

Preparation and Properties of Cyclorubber. A. H. Krause, H. E. Scott, A. G. Susie, *Rubber Age (N. Y.)*, Nov., 148, p. 189.

Butadiene-Styrene Chemical Rubbers Polymerized at Low Temperatures. W. F. Tuley, *Rubber Age (N. Y.)*, Nov. 1948, p. 193.

Oxidized Lignin as a Reinforcing Agent for Rubber. R. A. V. Raff, G. H. Tomlinson II, T. L. Davies, W. H. Watson, *Rubber Age (N. Y.)*, Nov., 1948, p. 197.

Reclaimed Rubber Today *versus* Prewar. A. Fuhrmann, R. L. Randall, *Rubber Age (N. Y.)*, Nov., 1948, p. 201.

Chemical Engineering Research at The B. F. Goodrich Co. A. B. Japs, *Ind. Eng. Chem.*, Nov. 1948, p. 2021.

Polymerization Units for Thermosetting Resins. F. E. Reese, E. Perry, *Ind. Eng. Chem.*, Nov., 1948, p. 2039.

Methacrylonitrile and Acrylonitrile. L. M. Peters, K. E. Marple, T. W. Evans, S. H. McAllister, R. C. Castner, *Ind. Eng. Chem.*, Nov., 1948, p. 2046.

Vinyl and Allyl Silicone Polymers and Coploymers. D. T. Hurd, G. F. Roedel, *Ind. Eng. Chem.*, Nov., 1948, p. 2078.

Emulsion Copolymerization of Isoprene and Styrene. A. J. Johanson, L. A. Goldblatt, *Ind. Eng. Chem.*, Nov., 1948, p. 2086.

Chromatographic Fractionation of Some Synthetic Elastomers. I. Landler, *Rubber Chem. Tech.*, July, 1948, p. 682.

Methods in Rubber Research. I. The Development of Plasticity Tests. R. W. Whorlow, *India Rubber J.*, Oct. 9, 1948, p. 3. **II.** Dynamic Properties of Rubber. L. Mullins, *Ibid.* Oct. 16, p. 3. **III.** The Development of Hardness Tests. A. L. Soden, *Ibid.*, Oct. 23, p. 3. **IV.** Infrared Spectroscopy in Relation to Rubber. J. Mann, *Ibid.*, Oct. 30, p. 14. **V.** Investigating Work Problems. R. C. W. Moakes, *Ibid.*, Nov. 6, p. 3. **VI.** Rubber Information, T. R. Dawson, T. H. Messenger, *Ibid.*, Nov. 13, p. 12.

Thermal Effects on Flexural Strength of Laminates. P. Norelli, *Modern Plastics*, Nov., 1948, p. 121.

Polyisobutylene-Polyethylene Blends. R. G. Newberg, D. W. Young, H. C. Evans, *Modern Plastics*, Dec., 1948, p. 119.

Determination of Tensile Strength of Natural Rubber and GR-S. T. Higuchi, H. M. Leeper, D. S. Davis, *Anal. Chem.*, Nov., 1948, p. 1029.

Advantages of Butyl Rubber in Organic Analysis. A. H. Corwin, C. Karr, Jr., *Anal. Chem.*, Nov., 1948, p. 1116.

Alpeth Cable Sheath. R. P. Ashbaugh, *Bell Labs. Record*, Nov., 1948, p. 441.

Modern Methods of Covering Rubber and Latex Thread. O. Pennenkamp, *Kaut. u. Gummi*, 1, 8, 212 (1948).

Investigation of Carbon Black in the Rubber Industry. H. Paetsch, *Kaut. u. Gummi*, 1, 9, 241 (1948).

Some Factors Affecting the Continuous Polymerization of GR-S. D. H. Francis, H. R. Sontag, *Rubber Age* (*N. Y.*), Nov., 1948, p. 183.

An Improved Low-Temperature Brittleness Test. E. F. Smith, G. J. Dienes, *ASTM Bulletin*, Oct., 1948, p. 46.

Why Use Rubber. Presenting Some of the Arguments in Favor of the Natural Raw Material. H. E. Dimsey, *India Rubber J.*, Nov. 20, 1948, p. 3.

Attempt to Produce Carbon Black by Fine Grinding. J. G. M. Bremner, J. H. Colpitts, *Trans. Inst. Rubber Ind.*, Aug., 1948, p. 35.

Canadian Rubber Developments. E. J. Buckler, *Trans. Inst. Rubber Ind.*, Aug., 1948, p. 52.

Emulsifiers for GR-S from Resin Acid Derivatives. F. L. McKennan, A. J. Johnson, E. T. Field, R. V. Lawrence, *Ind. Eng. Chem.*, June, 1949, p. 1296.

Man-Made Fibers in Tire Casings. J. W. Illingworth, *Trans. Inst. Rubber Ind.*, Aug., 1948, p. 59.

Electrically Conducting Rubber. K. A. Lane, E. R. Gardner, *Trans. Inst. Rubber Ind.*, Aug., 1948, p. 70.

The Use of Neoprene in Special Applications. P. Ottenhoff, *Ind. chim. belge*, 13, 86 (1948).

Carbon Black Statistics—Second Quarter, 1949

Following are statistics for the production, shipments, producers' stocks, and exports of carbon black for the second quarter of 1949. Production, shipment, and inventory figures are compiled from reports made available to the Bureau of Mines by the National Gas Products Association and by direct reports from producing companies whose operations are not covered by the Association. Export figures are reported by the Department of Commerce, but are not fully comparable in a given month because of the lapse of time between loading and producing plants and clearance for export.

(Thousands of Pounds)

	April	May	June	First Six Months
Production:				
Contact types	54,715	54,364	49,042	323,204
Furnace types	52,522	50,992	48,895	303,824
TOTALS	107,237	105,356	97,937	627,028
Shipments:				
Contact types	39,980	43,014	42,954	268,665
Furnace types	49,628	47,416	47,670	296,038
TOTALS	89,608	90,430	90,624	564,703
Producers' Stocks, End of Period:				
Contact types	63,225	74,575	80,663	80,663
Furnace types	93,181	96,757	97,982	97,982
TOTALS	156,406	171,332	178,645	178,645
Exports:				
Contact types	16,338	12,843	10,538	100,687
Furnace types	11,473	6,715	7,399	51,391
TOTALS	27,811	19,558	17,937	152,078

SOURCE: Bureau of Mines, United States Department of Interior, Washington 25, D. C.

Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	July 30	Aug. 27	Sept. 3	Sept. 10	Sept. 17	Sept. 24
Nov.	16.12	16.59	17.46	17.63	18.02	16.53
Jan.	15.98	16.36	17.10	17.26	17.66	16.25
Mar.	15.86	16.17	16.90	17.10	17.50	16.15
May	15.70	16.04	16.65	16.78	17.20	15.85
July	15.60	15.95	16.55	16.68	17.10	15.65
Sept.	15.50	15.90	16.45	16.58	17.00	15.55
Total weekly sales, tons	4,280	4,060	5,310	8,150	10,270	17,120

THE rubber futures market on the Commodity Exchange went through a month of hectic activity during September in the face of changing economic and financial conditions. Activity could be separated into four rather definite stages, each with its own trends and causative factors.

The first stage, extending from September 1 to 12, was one of advancing prices as the result of three factors: (1) expectation that any agreement concerning rubber reached in the Anglo-American economic talks in Washington would strengthen the price of crude rubber; (2) slim offerings from Singapore at high prices, adding to the scarcity of top-grade rubber in the New York market; and (3) open interest in September contracts consistently over-balancing the amount of certificated lots available in the Exchange warehouse.

On September 12 it was announced that as a result of the economic talks, the United States would reduce its minimum usage amount of synthetic rubber under R-1 and negotiate with Great Britain toward a stepped-up stockpile buying program. This announcement initiated the second stage of market activity which lasted through September 16. Prices rose steeply with futures advancing 35-42 points, but toward the end of the week rumors that the pound would be devaluated brought on some nervous selling that wiped out part of the gains made earlier in the week.

The third market stage began with the announcement of the devaluation of the British pound on September 18 and resulted in two days of frantic activity on the Exchange while prices dropped about 2¢ a pound in wild trading that set record volumes for the postwar period to date. Although devaluation had been reported imminent for some time, the actual announcement caught the market by surprise, and the activity of the Exchange was paralleled by flurries in the London and the Singapore markets where prices advanced to compensate for the drop in sterling value.

The fourth and concluding market stage began on September 21 and was a period of readjustment to the devaluation decline. Prices recovered somewhat from the lows set on September 20, and interest was again shown in the meeting in Washington on September 23 of the Rubber Advisory Committee in connection with revision of synthetic rubber use requirements. The announcement by the United States Department of Commerce during the week-end that Rubber Order R-1 has been revised to require minimum usage of synthetic rubber of about 170,000 tons came as a surprise to some market observers. The usage reduction had been expected to be as large as 100,000 tons, instead of the actual reduction of 50,000 tons, since voluntary usage of synthetic rubber is at the 90,000-ton level to date.

It has been stated, however, that domestic consumption of synthetic rubber depends more on the price level of crude rubber than on R-1, and unless crude maintains a price that compares favorably with that of synthetic, manufacturers will continue to use large quantities of synthetic. The advance in rubber prices abroad, in the reaction to sterling devaluation, is expected to encourage increased Malayan production of crude, which in the long run may have a restraining effect on prices. At the same time maintenance of crude rubber prices at lower levels could bring pressure for a reduction in the price of synthetic.

As for actual rubber futures prices on the Exchange during September, November futures opened the month at 17.18¢, rose to high of 18.37¢ on September 13, fell to the low of 16.28¢ on September 20 as a result of devaluation, then recovered somewhat to close the month at 16.33¢. The postwar record volume of sales of 5,790 tons was set on September 20, and this record together with increased activity during the month resulted in a postwar record volume of trading for the month of 42,600 tons. The increased activity of the market during September can be seen in comparison to the sales volume of 25,450 tons set during August.

Latices

A TIGHT position has developed in the *Hevea* latex supply picture, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's September *Rubber Report*. *Hevea* latex stocks of 8,059 long tons, dry weight, on July 31 represent the lowest level since the war. Stocks afloat of 2,500 long tons are also not large, and domestic consumption is not only holding steady at about 2,800 tons a month, but is also expected to rise steadily.

Mr. Nolan gives July imports of *Hevea* latex as 2,267 long tons; while consumption was 2,730 long tons. *Hevea* latex bulk prices remain at 23.5-25.5¢, although certain major producers advanced their prices to 24.5¢ on September 12. August consumption of *Hevea* latex was expected to exceed 3,000 long tons, and it is believed that consumptions in excess of 3,000 tons a month will soon be the rule.

GR-S latex production declined to 1,347 long tons, dry weight, in July, probably because of lower consumption in tires. August production reached 1,844 long tons, and this level is expected to be maintained during September and October. GR-S latex bulk prices remained unchanged at 18.5-20.25¢ a pound.

New York Outside Market

WEEK-END CLOSING PRICES

	July 30	Aug. 27	Sept. 3	Sept. 10	Sept. 17	Sept. 24
No. 1 R.S.S.:						
Sept.	16.25	16.88	17.75	18.00	18.25	17.25
Oct.-Dec.	16.25	16.88	17.75	17.88	18.13	16.63
No. 3 R.S.S.	14.25	14.88	15.75	16.00	16.25	15.25
No. 2 Brown	14.13	14.50	15.13	15.13	15.25	14.50
Flat Bark	11.75	12.00	12.50	12.38	13.00	13.50

AS ALWAYS, activity and prices in physical rubber on the New York Outside Market during September followed the trends of the futures market. The bullish factors affecting the market during the first half of the month resulted in price advances in the face of keen factory buying. Sterling devaluation brought a price drop of about 2¢ per pound, and the balance of the month saw only a quiet market as factory purchasers stayed on the sidelines awaiting further developments.

The spot price for No. 1 sheets opened the month at 17.50¢, rose to a high of 18.50¢ on September 13, fell with devaluation to a low of 16.50¢ on September 20, then fluctuated irregularly to close the month at 16.50¢. No. 3 sheets started at 15.50¢, reached a high of 16.50¢, a low of 14.88¢ on September 21, and ended the month at 15.13¢. After starting the month at 14.88¢, No. 2 Brown reached a high of 15.38¢ on September 13, a low of 13.88¢ on the 21st, and closed at 14.25¢ on September 30. Flat Bark started at 12.25¢ on September 1, reached a high of 13.50¢ on the 23rd, a low of 12.13¢ on the 20th, and ended the month at 13.25.

SCRAP RUBBER

AFTER a slow start the scrap rubber market showed some improvement during the last two weeks in September. Eastern reclaimers were said to be actively in the market for tires and tubes, with red and mixed tubes most in demand; while mixed tires moved steadily. Prices were firm and unchanged although some sales at slightly higher prices were reported to have been made.

The sterling devaluation announcement with its subsequent effect on the crude rubber market appeared to have no reaction in the scrap rubber trade. Dealers said that some time would elapse before the effects of devaluation would begin to be felt in the scrap rubber market, but it was believed that the scrap market would not be adversely affected.

No changes took place in scrap rubber prices last month. Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$12.50	$13.50
Peelings, No. 1	52.25	52.25
3	30.25	30.25
	(¢ per Lb.)	
Black inner tubes	4.00	4.00
Red passenger tubes	7.00	7.00

RECLAIMED RUBBER

CONSUMPTION of reclaimed rubber during September continued at the higher level noted in August. The main factors for this improved market were the reclaim price reductions announced in July, the seasonal increase in activity of the rubber industry with consequent greater demand for reclaim, and the rise in the crude rubber market.

Final July and preliminary July statistics on the domestic reclaimed rubber industry are now available. In June, produc

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ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

Effective July 1, 1947

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.25 per line (ten words)	Light face type 40c per line (ten words)	Light face type $1.00 per line (ten words)
Bold face type $1.60 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.40 per line (eight words)
Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Letter replies forwarded without charge, but no packages or samples.*

SITUATIONS WANTED

CHIEF CHEMIST OR TECHNICAL DIRECTOR. SUCCESSFUL Ph.D., age 38, long experience rubber, vinyls, adhesives, coatings. Publications, patents, technical society activities. Supervisional background. Location secondary. Available promptly. Address Box No. 427, care of INDIA RUBBER WORLD.

MANUFACTURER'S REPRESENTATIVE LOCATED IN LOS ANgeles desires lines for West Coast or Southern California area in rubber and plastic raw materials, semi-finished materials and equipment. Native of territory, Chem. Engr. Degree, knowledge of trade, established office. Address Box No. 434, care of INDIA RUBBER WORLD.

RUBBER CHEMIST, 20 YEARS' WIDE EXPERIENCE IN COMpounding, raw materials, and all factory operations is looking for new connection. 45 years old, Ph.D. Factory, laboratory, or technical sales. Address Box No. 428, care of INDIA RUBBER WORLD.

RUBBER CHEMIST—AVAILABLE FOR CONSULTATION AND special problems or part-time work. Experienced in large and small plant operations with variety of products from compounding, development, and mechanical aspects. Will travel anywhere in world. Located Akron, Ohio. All replies confidential. Address Box No. 429, care of INDIA RUBBER WORLD.

RETIRED RUBBER EXECUTIVE, OHIO REGISTERED PROfessional engineer, desires part- or full-time work in consulting, sales engineering, inspection of industrial products to meet specifications, etc. Address Z. E. SARGISSON, 1080 Delia Ave., Akron 20, Ohio.

MANAGEMENT — 23 YEARS' DIVERSIFIED EXPERIENCE with five mechanical rubber goods plants, employing from 30 to 1,100 employes. Management, costs, sales, industrial engineering experience. Practical, plus theoretical, knowledge. Age 45. Please outline your proposition. Address Box No. 430, care of INDIA RUBBER WORLD.

PROGRESSIVE AND ALERT INDIVIDUAL NOW EMPLOYED as technical manager seeks technical sales position with company manufacturing or merchanting compounding ingredients and chemicals for the rubber and plastics industries. Twelve years' experience in research, development, compounding, factory processing, production and sales. Age 31. Graduate. Address Box No. 432, care of INDIA RUBBER WORLD.

TECHNICAL DIRECTOR—CHIEF CHEMIST IMMEDIATELY available owing to company dissolution. Fully experienced in administration, direction, supervision, and pursuit of research-developments, production and processing controls of all types of sponge rubbers, latex foams and neoprene foams. Excellent academic, industrial, and synthetic organic chemistry background. Location immaterial. Address Box No. 435, care of INDIA RUBBER WORLD.

WANTED

RUBBER PRODUCTS PATENTS desired; large national mechanical Manufacturer; confidential. Complete details first letter.

Address Box No. 341, care of INDIA RUBBER WORLD.

SITUATIONS WANTED (Continued)

PRODUCTION MANAGER-CHEMIST, WITH WIDE PRACTICAL experience in factory production, compounding, and development will consider new position for valid reasons. Molded items, coating and impregnating, adhesives, and high-pressure plastic laminates. Can handle customer contact. Prefer Midwest location with stable, progressive company. Address Box No. 437, care of INDIA RUBBER WORLD.

CHEMIST—SUPERVISOR, EXPERIENCED (8 YRS.) IN COMpounding mechanical goods, especially hose and belts; supervisory experience in same field, and in design. Opportunity with reliable company in rubber or allied field sought. Address Box No. 438, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

WANTED

Directional Sales Manager for reputable manufacturer of Industrial Rubber Products (Belting, Hose, Packings) to assume full responsibility of sales through branches. Starting salary $10,000 per year. Only wide experienced and aggressive need apply. Applications will be treated in strictest confidence. Reply Box No. 436, Care of India RUBBER WORLD.

TECHNICAL DIRECTOR—KNOWLEDGE OF COMPOUNDING of stocks and knowledge of constructions of mechanical rubber goods (hose and belting) with executive ability to direct engineering department and laboratory personnel. State age, education, experience, and salary requirements. Address Box No. 433, care of INDIA RUBBER WORLD.

DEVELOPMENT CHEMIST, WITH AT LEAST THREE YEARS' experience in formulation of latex-type adhesives or coatings. Excellent position open in progressive development laboratory for man with initiative and record of achievement. Please outline qualifications in letter to MINNESOTA MINING & MFG. CO., 411 Piquette Avenue, Detroit 2, Mich., Attn: Chief Chemist.

RUBBER CHEMIST OR TECHNICAL SUPERVISOR, WITH knowledge of compounding and manufacturing procedures used in manufacture of slab stocks, soling, and flooring. Location South: state age, experience, and salary desired. Address Box No. 439, care of INDIA RUBBER WORLD.

RUBBER CEMENT MAN TO TAKE CHARGE OF MILL AND churn rooms; cement to be used for combining purposes for the shoe and novelty trades. Only those with experience will be considered. Plant located Long Island, N. Y. Address Box No. 441, care of INDIA RUBBER WORLD.

WANTED — Large engineering firm wishes to acquire several complete Rubber Plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible, strictest confidence. Box 1220, 1474 Broadway, New York 18, N. Y.

(Classified Advertisements Continued on Page 125)

tion totaled 18,849 tons; consumption 19,316 long tons; exports, 694 long tons; and month-end stocks, 30,684 long tons. Preliminary figures for July give a production of 14,612 long tons; consumption, 16,019 long tons; exports, 681 long tons; and month-end stocks, 29,274 long tons.

No changes were made in reclaimed rubber prices during September, and current prices are listed below.

Reclaimed Rubber Prices

	Sp. Gr.	¢ per lb.
Whole tire	1.18-1.20	8.25/ 8.75
Peel	1.18-1.20	8.25/ 9.25
Inner tube		
Black	1.20-1.22	11.50/12.50
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

COTTON AND FABRICS

New York Cotton Exchange
Week-End Closing Prices

Futures	July 30	Aug. 27	Sept. 3	Sept. 10	Sept. 17	Sept. 24
Dec.	29.65	29.86	29.87	29.75	29.74	29.60
Mar.	29.61	29.80	29.84	29.67	29.71	29.57
May	29.50	29.68	29.76	29.61	29.63	29.50
July	28.93	29.02	29.11	29.06	29.08	28.96
Oct.	26.77	27.26	27.30	27.35	27.37	27.13
Dec.	26.67	27.14	27.18	27.22	27.20	27.03

PRICES on the New York Cotton Exchange during September moved downward under the pressure of heavy hedging spurred by large sales of spot cotton in southern markets. Hedging was at its heaviest of the season, with selling by local and commission houses believed influenced by the possibility that government loan prices may be somewhat lower next year. Confusion over the pending farm program also contributed to selling volume.

Foreign devaluation announcements had only a slight effect on cotton futures because of the government loan system and the stabilizing effect of a steady cotton outlet provided by ECA. It is also believed that American cotton, although at a price disadvantage in competition with sterling countries, possesses better quality and adaptability than does foreign cotton.

The spot price for 15/16-inch middling cotton began the month at 31.33¢, rose to a high of 31.37¢ on September 7, then fell to close the month at a low of 30.44¢. December futures showed corresponding movement, starting the month at 29.88¢, reaching a high of 30.05¢ on September 7, a low of 29.56¢ on September 29, and closing the month at 29.57¢.

Fabrics

Fourth-quarter business in wide industrial gray goods continued active during September, unaffected by a slowdown in other cotton fabric lines that developed toward the end of the month. Chafers continued to sell steadily at about 30 to 45 days ahead, with prices firm. Hose and belting ducks continued to improve, but some October goods were still to be had. In sateens the tight supply situation remained unchanged, with November and December deliveries in good demand, and prices firm. Wide drills remained active, with most interest centered in the 1.85- and 2.25-yard constructions.

The market in osnaburgs was slow for the most part, although October sales were made in the 40-inch 40x26 2.11-yard construction. Sheetings enjoyed continued activity, and sales were made in all types through January. Most types of print cloths were quiet, although sales in February for the 39-inch 68x72 4.75-yard construction were noted, and other types sold into December. The raincoat fabric market showed considerable improvement with good business reported and advancing prices on 38.5-inch 64x60 print cloths.

Current prices for cotton fabrics are as follows:

Cotton Fabrics

Drills		
59-inch 1.85-yd.	*yd.*	$0.36/$0.37
2.25-yd.		.33
Ducks		
38-inch 1.84-yd. S. F.	*yd.*	.425
2.00-yd. D. F.		.31/.325
51.5-inch 1.35-yd. S. F.		.4575/.46
66-inch 1.02-yd. S. F.		.73
Hose and belting		.58/.60
Osnaburgs		
40-inch 2.11-yd.	*yd.*	.22
Raincoat Fabrics		
Bombazine, 64x60 5.35-yd.	*yd.*	.195
Print cloth, 38½-inch, 64x60		.165/.17
Sheeting, 48-inch, 4.17-yd.		.23
52-inch 3.85-yd.		.2488
Chafer Fabrics		
14-oz./sq. yd. Pl.	*lb.*	.635/.65
11-65-oz./sq. yd. S.		.58/.60
10-80-oz./sq. yd. S.		.62
8.9-oz./sq. yd. S.		.635
14-oz./sq. yd. S.		.59
Other Fabrics		
Headlining, 59-inch 1.35-yd. 2-ply	*yd.*	.565
64-inch 1.25-yd. 2-ply		.6063
Sateens, 53-inch 1.32-yd.		.57
58-inch 1.21-yd.		.6238
Tire Cords		
K. P. std., 12-3-3	*lb.*	.685
12-4-2		.675

RAYON

THE slight weakening in demand for rayon tire cord and fabric predicted for the end of this year made its appearance during September. While the decline in sales was enough to cause curtailment of output by at least one producer, the industry foresees this reduction as only temporary in nature. The weakness is believed due to increased competition among tire manufacturers, but an uptrend in tire sales is expected after the first of the year.

The smaller tire producers have been most affected by the drop in tire sales, and this condition has been reflected in a reduction in yarn demand since the smaller tire firms do not do their own fabricating and are therefore the largest customers for processed rayon cord. On the other hand the major tire manufacturers, who ordinarily are the largest customers for rayon tire yarn, have not only cut back production of tires, but are also making use of this curtailment period to use up their stocks of cotton yarns purchased when rayon was in tighter supply than it is now. When the tire firms have liquidated their cotton inventories, the shift to rayon tire cord and fabric is expected to be resumed.

It is reported that an adhesive finish for high-tenacity rayon yarn, of the type used by the rubber industry, will be introduced next year. The development of this finish will remove one of the biggest obstacles to greater acceptance of rayon yarn by rubber goods manufacturers. This finished yarn would be ready for immediate use, saving rubber firms the cost of processing, and could also be stored if necessary; whereas present predips of latex require the rayon yarn to be used immediately.

Domestic shipments of rayon during August totaled 88,100,000 pounds, 22% above the July level. Of this figure, 68,800,000 pounds were of filament yarn, consisting of 44,3000,000 pounds viscose and cupra and 24,500,000 pounds acetate. August deliveries of high-tenacity viscose yarn amounted to 23,400,000 pounds.

No changes occurred in rayon tire yarn and fabric prices last month; current prices follow.

Rayon Fabrics

Tire Yarns		
1100/480	$0.55	
1100/490	.55	
1150/490	.55	
1650/720	.54	
1650/980	.54	
1900/980	.54	
2200/960	.53	
2200/980	.53	
4400/2934	.55	$0.56
Tire Fabrics:		
1100/490/2	.67	
1650/980/2	.645	.66
2200/980/2	.63	

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Pfd.	$1.75 q.	Sept. 30	Sept. 23
American Wringer Co., Inc.	Com.	0.15	Oct. 1	Sept. 15
Anaconda Wire & Cable Co.	Com.	0.50	Oct. 25	Oct. 14
Armstrong Rubber Co.	A & B	0.25	Oct. 1	Sept. 16
	Pfd.	0.59⅜ q.	Oct. 1	Sept. 16
Baldwin Rubber Co.	Com.	0.10 extra	Oct. 26	Oct. 14
		0.15 q.	Oct. 26	Oct. 14
Borg-Warner Corp.	Pfd.	0.87½ q.	Oct. 1	Sept. 15
Dewey & Almy Chemical Co.	Com.	0.25 irreg.	Sept. 20	Sept. 10
DeVilbiss Co.	Com.	0.12½	Oct. 20	Oct. 10
Endicott Johnson Corp.	Com.	0.40	Oct. 1	Sept. 19
	Pfd.	1.00 q.	Oct. 1	Sept. 19
Faultless Rubber Co.	Com.	0.50	Oct. 1	Sept. 15
General Electric Co.	Com.	0.50	Oct. 25	Oct. 23
General Tire & Rubber Co.	4¼% Pfd.	1.06¼ q.	Sept. 30	Sept. 20
	3¼% Pfd.	0.81¼ q.	Sept. 30	Sept. 20
	3¾% Pfd.	0.94¾ q.	Sept. 30	Sept. 20
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	1.00	Oct. 1	Sept. 9
Jenkins Bros.	Com.	0.25	Sept. 30	Sept. 16
	Fdrs.	1.00	Sept. 30	Sept. 16
	Fdrs. Pfd.	1.75	Sept. 30	Sept. 16
Johnson & Johnson	Com.	5% stock	Nov. 15	Oct. 25
	Pfd. B	0.87½ q.	Nov. 1	Nov. 1
Mansfield Tire & Rubber Co.	Com.	0.10 reduced	Sept. 20	Sept. 10
	Pfd.	0.30 q.	Oct. 1	......
Mohawk Rubber Co.	Com.	0.25	Sept. 30	Sept. 15
Rome Cable Corp.	Com.	0.15 q.	Oct. 1	Sept. 14
	4% Cum. Cv. Pfd.	0.30 q.	Oct. 1	Sept. 14
Thermoid Co.	Com.	0.62½ q.	Nov. 1	Oct. 15

United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

Imports for Consumption of Crude and Manufactured Rubber

	June, 1949		First Six Months, 1949	
	Quantity	Value	Quantity	Value
UNMANUFACTURED, Lbs.				
Crude rubber	109,844,448	$18,084,566	726,047,153	$123,762,335
Rubber latex	4,882,654	1,113,169	28,538,069	6,667,115
Balata	97,827	20,821	1,079,481	299,512
Jelutong or Pontianak	165,801	47,515	898,276	376,972
Gutta percha	60,985	16,292	170,841	85,399
Chicle	291,439	151,837	6,187,534	4,183,728
Synthetic rubber	2,524,273	484,834	15,549,884	2,902,651
Scrap rubber	1,108,775	29,895	6,766,556	156,501
TOTALS	118,976,202	$19,948,929	785,237,794	$138,434,213
MANUFACTURED				
Tires: auto, bus, truck . *no.*	119	$1,426	2,346	$33,304
Bicycle *no.*	542	1,163	5,146	8,983
Other *no.*	2	20	28	225
Inner tubes: auto, etc. *no.*	630	683	2,014	4,709
Rubber footwear:				
Boots *prs.*	6	20	18,592	34,446
Shoes and overshoes *prs.*	782	1,161	48,180	45,690
Rubber-soled canvas shoes *prs.*	2,431	2,578	47,964	35,672
Athletic balls: golf *no.*	6,000	2,057	64,140	24,931
Tennis *no.*	36	12	13,781	3,445
Other *no.*	199,084	16,629	......	165,184
Rubber toys, except balloons	......	26,782	......	88,396
Hard rubber products	......	982	......	5,575
Rubberized printing blankets *lbs.*	1,350	2,272	1,390	2,333
Rubber and cotton packing *lbs.*	62	84	5,580	7,931
Gaskets and valve packing	......	144	......	1,122
Belting *lbs.*	772	1,153	22,715	33,024
Hose and tubing	......	1,010	......	4,818
Drug sundries	......	4,132	......	7,132
Rubber bands *lbs.*	250	108	6,126	2,990
Instruments *doz.*	291	1,612	291	1,612
Golf ball centers *doz.*	120	238	120	238
Heels and soles *lbs.*	33,335	923	33,335	923
Gutta percha manufactures *lbs.*	850	648	2,342	1,749
Synthetic rubber products	......	441	......	2,699
Other soft rubber goods	......	19,225	......	120,016
Rubber products	......	......	......	2,458
TOTALS	......	$85,503	......	$639,605
GRAND TOTALS, ALL RUBBER IMPORTS	......	$20,034,432	......	$139,07[illegible],818

Exports of Domestic Merchandise

	June, 1949		First Six Months, 1949	
	Quantity	Value	Quantity	Value
UNMANUFACTURED, Lbs.				
Chicle and chewing gum bases	357,500	$170,555	1,510,660	$765,977
Balata	1,620	6,090	4,242	14,394
Synthetic rubbers: GR-S	203,671	52,775	2,116,086	483,124
Butyl	10,900	2,032	62,860	11,829
Neoprene	661,015	229,404	3,693,071	1,294,257
Nitrile	272,368	135,071	2,095,648	975,399
"Thiokol"	......	......	11,150	7,734
Polyisobutylene	34,427	10,270	45,577	18,004
Other	132,874	30,887	181,341	46,035
Reclaimed rubber	1,554,357	131,562	12,786,218	1,020,394
Scrap rubber	6,171,682	224,160	24,306,207	827,846
TOTALS	9,400,414	$992,806	46,813,060	$5,464,993
MANUFACTURED				
Rubber cement *gals.*	62,419	$115,714	331,482	$584,493
Rubberized fabric: auto cloth *sq. yds.*	4,095	5,755	142,081	143,596
Piece goods and hospital sheeting *sq. yds.*	99,209	69,284	525,433	392,096
Rubber footwear:				
Boots *prs.*	5,278	21,805	94,832	315,800
Shoes and overshoes *prs.*	4,419	6,108	72,800	111,216
Rubber-soled canvas shoes *prs.*	29,915	44,800	241,036	441,867
Soles *doz. prs.*	23,153	41,480	132,992	349,605
Heels *doz. prs.*	38,401	32,822	270,679	264,204
Rubber soling and toplift sheets *lbs.*	70,465	24,721	477,974	120,961
Gloves and mittens *doz. prs.*	11,274	37,252	75,337	267,873
Drug sundries: water bottles and fountain syringes *no.*	25,320	14,553	149,835	94,237
Other	......	271,449	......	1,446,815
Rubber and rubberized clothing	......	141,749	......	806,607
Balloons	......	36,573	......	265,016
Rubber toys and balls	......	21,605	......	119,444
Erasers *lbs.*	21,088	16,948	122,301	93,586
Hard rubber goods: battery boxes *no.*	20,514	36,000	219,219	282,438
Other electrical *lbs.*	179,619	112,624	949,542	482,105
Combs, finished *doz.*	1,028	1,958	31,939	38,619
Other	......	4,292	......	60,613
Tires and casings: truck and bus *no.*	95,918	4,081,209	554,550	23,512,007
Auto *no.*	34,331	495,185	270,803	3,697,299
Aircraft *no.*	1,503	140,407	14,229	755,425
Tractors, farm, etc. *no.*	20,105	617,343	122,435	3,274,125
Other off-the-road *no.*	3,298	326,325	26,227	1,929,258
Bicycle *no.*	14,785	17,491	73,110	90,514
Motorcycle *no.*	457	3,788	3,913	19,892
Other *no.*	1,897	23,820	16,255	244,639
Inner tubes: auto, truck, bus *no.*	88,889	306,641	589,511	2,043,218
Other *no.*	21,911	76,078	152,474	560,321
Solid tires: truck and industrial *no.*	3,099	$146,177	25,210	$1,422,786
Other *lbs.*	5,636	2,922	36,141	11,963
Tire repair materials: camelback *lbs.*	182,680	51,499	1,128,646	322,285
Other *lbs.*	150,890	92,962	999,485	584,076
Rubber and friction tape, except medical *lbs.*	38,521	26,811	239,290	175,881
Belting: auto and home *lbs.*	83,320	102,315	667,072	769,331
Transmission: V-belts *lbs.*	121,884	193,595	742,121	1,186,088
Flat belts *lbs.*	72,307	74,803	407,431	435,492
Other *lbs.*	93,940	85,870	368,970	387,604
Conveyer and levitator *lbs.*	96,308	79,184	763,767	572,345
Other *lbs.*	11,661	12,402	629,863	540,188
Hose and tubing *lbs.*	579,862	419,340	3,963,025	2,864,725
Packing *lbs.*	130,090	113,357	768,874	741,768
Mats, flooring, tiling *lbs.*	675,418	159,855	4,557,736	1,147,184
Thread: bare *lbs.*	21,004	26,150	184,983	285,712
Textile covered *lbs.*	17,865	28,982	68,847	161,552
Gutta percha manufactures *lbs.*	4,180	4,967	29,259	46,871
Latex and other compounded rubber for further manufacture *lbs.*	704,330	201,690	2,125,623	771,023
Other natural and synthetic rubber manufactures	......	311,508	......	2,039,413
TOTALS	......	$9,280,168	......	$57,274,276
GRAND TOTALS, ALL RUBBER EXPORTS	......	$10,272,974	......	$62,739,269

Reexports of Foreign Merchandise

	June, 1949		First Six Months, 1949	
	Quantity	Value	Quantity	Value
UNMANUFACTURED, Lbs.				
Crude rubber	1,055,695	$226,882	6,563,411	$1,351,110
Balata	......	......	39,186	21,450
Jelutong, gutta percha, and similar gums	......	......	2,000	3,520
Synthetic rubber: Butyl	......	......	5,000	998
Neoprene	401	161	401	161
Scrap rubber	51,212	4,309	51,212	4,309
TOTALS	1,107,308	$231,352	6,661,210	$1,381,548
MANUFACTURED				
Rubber soling and toplift sheets *lbs.*	......	......	1,805	$526
Drug sundries, except water bottles	......	......	......	1,721
Rubber and rubberized clothing	......	......	......	1,701
Toys and balls, except balloons	......	$5,571	......	13,208
Erasers *lbs.*	......	......	4,810	1,388
Tires and casings: truck and bus *no.*	4	206	34	2,170
Auto *no.*	......	......	55	563
Farm tractor and off-the-road *no.*	73	5,880	254	7,963
Tire repair materials, except camelback *lbs.*	......	......	315	172
Rubber and friction tape, except medical *lbs.*	......	......	423	295
Hose and tubing *lbs.*	......	......	1,541	827
Rubber packing *lbs.*	......	......	5,610	3,544
Latex and other compounded rubber for further manufacture *lbs.*	......	......	660	137
Other natural and synthetic rubber products	......	215	......	6,761
TOTALS	......	$11,872	......	$40,972
GRAND TOTALS, ALL RUBBER REEXPORTS	......	$243,224	......	$1,422,520

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

1948 Production Figures for Siam

Total 1948 rubber production of 93,731 long tons was reported by the Controller of the Rubber Bureau to the American Embassy; of the total it is estimated that 26.6% came from the Naradhivas District; other important producing districts were Songkla, with 18.5%, and Yala, with 17.2% of the whole. At the same time the total area of rubber plantations was put at approximately 1,500,000 rai, or 600,000 acres, which figure is above the previous estimate.

The production figure mentioned is close to total reported exports and would not allow for much smuggled rubber in 1948. The 1949 monthly production is expected to amount to 6,500 to 8,000 metric tons, suggesting that the final figure for 1949 will be below that of 1948.

In consequence of the emphasis laid by the Chairman of the Rubber Growers' Association in London on quality and grading of natural rubber, rather more attention is now being given to the improvement of trade standards—however, it is not expected that lax trade habits will be easily broken.

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United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

Imports for Consumption of Crude and Manufactured Rubber

	June, 1949		First Six Months, 1949	
	Quantity	Value	Quantity	Value
UNMANUFACTURED, Lbs.				
Crude rubber	109,844,448	$18,084,566	726,047,153	$123,762,335
Rubber latex	4,882,654	1,113,169	28,538,069	6,667,115
Balata	97,827	20,821	1,079,481	299,512
Jelutong or Pontianak	165,801	47,515	898,276	376,972
Gutta percha	60,985	16,292	170,841	85,399
Chicle	291,439	151,837	6,187,534	4,183,728
Synthetic rubber	2,524,273	484,834	15,549,884	2,902,651
Scrap rubber	1,108,775	29,895	6,766,556	156,501
TOTALS	118,976,202	$19,948,929	785,237,794	$138,434,213
MANUFACTURED				
Tires: auto, bus, truck . . *no.*	119	$1,426	2,346	$33,304
Bicycle *no.*	542	1,163	5,146	8,983
Other *no.*	2	20	28	225
Inner tubes: auto, etc. . *no.*	630	683	2,014	4,709
Rubber footwear:				
Boots *prs.*	6	20	18,592	34,446
Shoes and overshoes *prs.*	782	1,161	48,180	45,690
Rubber-soled canvas shoes *prs.*	2,431	2,578	47,964	35,672
Athletic balls: golf *no.*	6,000	2,057	64,140	24,931
Tennis *no.*	36	12	13,781	3,445
Other *no.*	199,084	16,629	......	165,184
Rubber toys, except balloons	......	26,782	......	88,396
Hard rubber products	......	982	......	5,575
Rubberized printing blankets *lbs.*	1,350	2,272	1,390	2,333
Rubber and cotton packing *lbs.*	62	84	5,580	7,931
Gaskets and valve packing	......	144	......	1,122
Belting *lbs.*	772	1,153	22,715	33,024
Hose and tubing	......	1,010	......	4,818
Drug sundries	......	4,132	......	7,132
Rubber bands *lbs.*	250	108	6,126	2,990
Instruments *doz.*	291	1,612	291	1,612
Golf ball centers *doz.*	129	238	120	238
Heels and soles *lbs.*	33,335	923	33,335	923
Gutta percha manufactures *lbs.*	850	648	2,342	1,749
Synthetic rubber products	......	441	......	2,699
Other soft rubber goods	......	19,225	......	120,016
Rubber products	......	......	......	2,458
TOTALS	......	$85,503	......	$639,605
GRAND TOTALS, ALL RUBBER IMPORTS	......	$20,034,432	......	$139,07[illegible],818

Exports of Domestic Merchandise

	June, 1949		First Six Months, 1949	
	Quantity	Value	Quantity	Value
UNMANUFACTURED, Lbs.				
Chicle and chewing gum bases	357,500	$170,555	1,510,660	$765,977
Balata	1,620	6,090	4,242	14,394
Synthetic rubbers: GR-S	203,671	52,775	2,116,086	483,124
Butyl	10,900	2,032	62,860	11,829
Neoprene	661,015	229,404	3,693,071	1,294,257
Nitrile	272,368	135,071	2,095,648	975,399
"Thiokol"	......	......	11,150	7,734
Polyisobutylene	34,427	10,270	45,577	18,004
Other	132,874	30,887	181,341	46,035
Reclaimed rubber	1,554,357	131,562	12,786,218	1,020,394
Scrap rubber	6,171,682	224,160	24,306,207	827,846
TOTALS	9,400,414	$992,806	46,813,060	$5,464,993
MANUFACTURED				
Rubber cement *gals.*	62,419	$115,714	331,482	$584,493
Rubberized fabric: auto cloth *sq. yds.*	4,095	5,755	142,081	143,596
Piece goods and hospital sheeting *sq. yds.*	99,209	69,284	525,433	392,096
Rubber footwear:				
Boots *prs.*	5,278	21,805	94,832	315,800
Shoes and overshoes *prs.*	4,419	6,108	72,800	111,216
Rubber-soled canvas shoes *prs.*	29,915	44,800	241,036	441,867
Soles *doz. prs.*	23,153	41,480	132,992	349,605
Heels *doz. prs.*	38,401	32,822	270,679	264,204
Rubber soling and toplift sheets *lbs.*	70,465	24,721	477,974	120,961
Gloves and mittens *doz. prs.*	11,274	37,252	75,337	267,873
Drug sundries: water bottles and fountain syringes *no.*	25,320	14,553	149,835	94,237
Other	......	271,449	......	1,446,815
Rubber and rubberized clothing	......	141,749	......	806,607
Balloons	......	36,573	......	265,016
Rubber toys and balls	......	21,605	......	119,444
Erasers *lbs.*	21,088	16,948	122,301	93,586
Hard rubber goods: battery boxes *no.*	20,514	36,000	219,219	282,438
Other electrical *lbs.*	179,619	112,624	949,542	482,105
Combs, finished *doz.*	1,028	1,958	31,939	38,619
Other	......	4,292	......	60,613
Tires and casings: truck and bus *no.*	95,918	4,081,209	554,550	23,512,007
Auto *no.*	34,331	495,185	270,803	3,697,299
Aircraft *no.*	1,503	140,407	14,229	755,425
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